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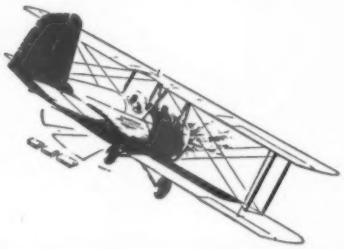

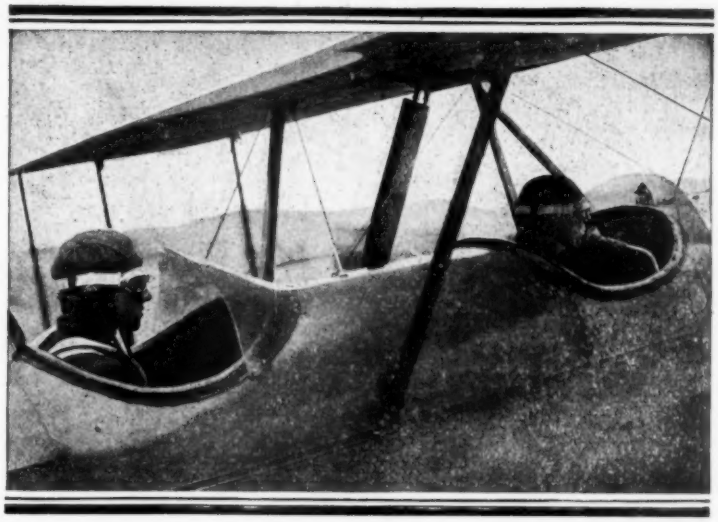

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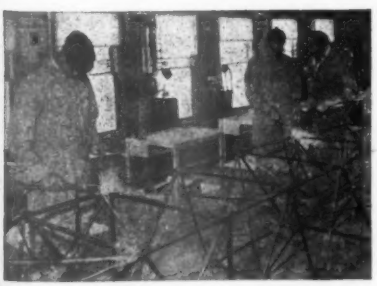

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Popular Aviation combined with Aeronautics: Vol. 7, Number 4. Published monthly by Aeronautical Publications, Inc., at 608 S. Dearborn St., Chicago, U. S. A. Subscription $2.50 per year; single copies 25 cents; foreign postage $1.00 per year extra. Entry at the Post Office, Chicago, Illinois, as second-class matter, July 19, 1930. under the act of March 3, 1879. Additional entry at South Whitley, Indiana.

Left to right:
Brother George Feltes, pilot, Father Phillip Delon, and George Pickenpack, co-pilot.

The "MARQUETTE MISSIONARY"

The transcontinental flight recently completed by Brother George J. Feltes in a Packard-Diesel powered Bellanca marks a new milepost in aviation history—for it was the first time that a plane crossed the United States under Diesel power.

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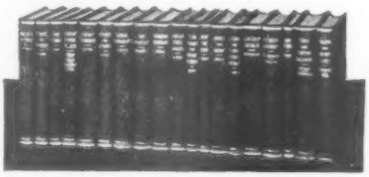

The Navigation of Aircraft

by Lieut. Logan C. Ramsey, U. S. Navy; Instructor, Naval Air Station, Pensacola, Fla. 237 pages, 51 illustrations, $4.50

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A group of foreign students. Reading from left to right: Luan Phongse-Sobhon, Bangkok, Siam; Abel Morales, Bolivia, S. A.; Edward O. Rolfe, Sherbrooke, Quebec, Canada; William F. Henderson, Montreal, Canada; Ernest M. Gilligan, Thane, Alaska; Narcisso Basso, Jr., Barcelona, Spain; William S. Crichton, Berreiton, Scotland.

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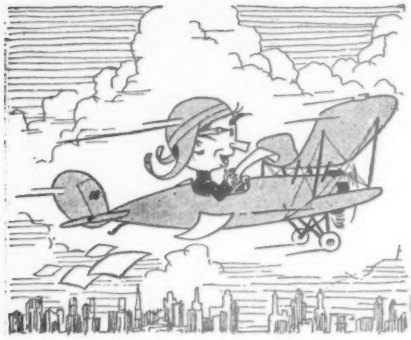
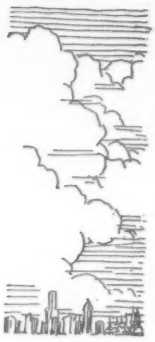


An Airy Chat *With the* Editor



EVERY once in a while POPULAR AVIATION introduces a novel idea which seems impossible to many of our readers. Several issues ago, for example, we suggested the idea of a glider being towed behind a battleship. We even ventured the idea that perhaps a glider could be towed across the Atlantic.

Six months ago that sounded rash. Today it sounds more rational. Although no glider pilot has yet made such a flight successfully, several attempts have been made.

Only recently Robert Lewis and Hugh Keaveny made the effort. They used a Peel glider boat similar to the type described in the September issue. These doughty pioneers were being towed by the liner "Saturnia," but were forced into the ocean after eight hours in the air. A faulty shock cord caused the trouble. The flyers' enthusiasm and clothes were considerably dampened, but they were promptly picked up by the lifeboats.

WE are offering you an interesting construction story this month on how to build an aeroplage. This craft will not get into the air—but it sure does fly. Just imagine a long stretch of hard sand—or a straight, smooth country road. And a high wind. Then picture a three- or four-wheel wagon with a big sail on it. Let 'er rip at 40-50 m. p. h.—and boy, you're sure sailin'.

Do you like the idea of a feature sportcraft article each month?

POOR ol' Rathbun is sure getting it from every angle. Ever since he said that 500 m. p. h. can't be done (September issue) he is flooded with letters and exhortations from readers who expressed everything from disillusionment to disgust.

But just the same, John B. is sticking to his guns. In fact his trigger finger is getting itchy and he is liable to burst forth any moment.

The chief objection to Mr. Rathbun's theory is that a propeller tip travels more than 500 m. p. h.

Mr. Rathbun is now preparing an answer to his many critics—but he gives us this hint. A propeller tip may travel through space at that speed, but not through air. The air flow will tend to follow the propeller tip around its course, almost as fast as the tip itself.

That sounds reasonable and Mr. Rathbun offers even better proofs in his answer. He also brings to his support the findings of Cowley and Levy, two famous British scientists who directed the activities of the National Physical Laboratory of England. This institution furnished all the scientific data to the British army and air service during the war. Cowley and Levy have proved by experiment that an object could not travel at the speed of sound—causing a prohibitive air friction.

Mr. Rathbun also states that Frederick W. Lanchester, Chief Engineer for Rolls Royce, supports his belief. For those who want some very technical information on this subject, read "Aeronautics in Theory and Experiment," by Cowley and Levy. For those who will take Mr. Rathbun's word for it—watch for the December issue.

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J. Don Alexander, Dealers' Sales; Archibald Black, Transportation; Louis Bleriot, French Activities; R. J. Goodman-Crouch, Engineering; Sherman Mills Fairchild, Aerial Photography; Warren Irving Glover, Air Mail; Louise Thaden, Women's Activities; Charles Sherman Jones, Flying Schools; Alexander Klemin, Aerodynamics and Structures; Emory S. Land, Aviation Safety; B. Russel Shaw, Airports.

AMONG those who took exception to Mr. Rathbun was Lt. R. S. Barnaby, U. S. N. Of course, you have all heard about Lt. Barnaby—he is renowned for his glider flights, particularly for his stunt of being released from a dirigible. Lt. Barnaby naturally brought out the fact that a propeller tip will frequently travel from 700 to 900 m. p. h. and then goes on to say:

> *"Mr. Rathbun states that it is a well-known fact that projectiles get so hot in their flight that they become semi-plastic. How then does he account for the fact that 16-inch shells pierce 16-inch plate with ease and appear only slightly shorter and fatter as a result thereof, and that these shells launched at about 2600 feet per second (1770 miles an hour) carry loads of high explosive to their destination without exploding them from overheat. Ordnance experts say that except for the heat engendered in the firing, including the friction in the bore, and that generated in the impact of striking the target, the temperature rise of a projectile is negligible.*
>
> *"Mr. Rathbun in his calculations entirely failed to take into account the cooling effect of the air rushing past the body in question. Until velocities approaching that of the meteors (around 67,000 miles per hour) are reached the heat carried away from the body by the air will prevent any very great temperature rise from its friction."*

WE are indeed fortunate in securing Louise Thaden to conduct Lady Mary Heath's former column as Women's Editor.

Louise Thaden was born 24 years ago as Louise McPhetridge at Bentonville, Arkansas. She went to the U. of Arkansas, and then entered aviation in 1927 out in San Francisco—literally from the ground up. She did everything from sweeping floors to selling $3000 airplanes.

Louise was kept rather busy and wasn't able to squeeze in the necessary hours until Feb. 8, 1928, when she received her private pilot's license. A year later (April '29) she obtained her transport license.

Between these two licenses she took out another one—and married Herbert von Thaden. They quietly slipped off to Reno, Nev. (of all places).

Among Mrs. Thaden's achievements are:

Dec. 1928, women's altitude record, 20,270 ft.
Mar. 1929, women's endurance record, 22 hours.
Apr. 1930, women's first official speed record, 156 m. p. h.
Aug. 1929, First place in the heavy division of the first women's air derby.

It was a great disappointment to many of *(Continued on Page 50)*

POPULAR AVIATION

Combined With

Aeronautics

A magazine for everyone interested in Gliders—Lightplanes—Models

Volume 7 NOVEMBER, 1930 Number 4

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IN QUEST

By
CAPT. JACK C. BURSEY, R. A F.

A true incident of the Battle of the Somme

ON the first day of July, 1916, there commenced a major battle of the World War which in its very intensity stands out as one of the big points in the ultimate successful conclusion of the war.

It was my extreme pleasure to have a hand in the launching of the battle, and once it was well under way on the ground, there transpired some of the most bitter fighting in the air, for the famous Red Knight, Baron Manfried von Richthofen with his gaudily painted circus of Fokkers was present as soon as hostilities started.

A description of the events leading up to the actual attack on the ground will be of interest to you. In all attacks, both on the ground and in the air, the actual hour of attack is always concealed from everyone under the cryptic cognomen of "zero hour."

Zero hour might be four o'clock in the afternoon, or it might be exactly seventeen minutes past two in the early morning. A few minutes before zero hour came around, the information was passed around to all troops, so that they could be in readiness.

Never shall I forget "zero hour" of the battle of the Somme!

For some time previous to zero hour, the entire battle front which was to be attacked was subjected to a very heavy curtain of fire, this barrage being intended to break down the morale of the enemy troops, to assist in breaking down any fortifications that might bar the progress of the boys once they started "over the top," and to cut pathways through the barbed wire entanglements, that the boys might go forward undaunted. There's nothing more terrifying than to be caught in barbed wire and have machine gun bullets and shells whistling all around you!

MY particular detail for this battle was to wait for the attack to start, and when our boys had advanced into new positions, I was to signal them with a Klaxon horn attached to the under side of my plane, and they would light flares and lay out white strips of material showing me just where their new front line was.

Then I had to draw this position on a trench map, and shoot it over to Headquarters for the use of the allied generals.

I was floating along at about a thousand feet watching the artillery bombardment which preceded zero hour for one hour. Guns of all calibers joined in raining shot and shell down on the enemy front lines and supports. The heavy howitzers were plunking huge shells on German billets, on roads and crossroads, and on the strong posts in the rear.

It was a stupendous spectacle.

The air was thick with smoke—the entire atmosphere suffused with the acrid, pungent smell of powder. The whole broad belt of dusty brown which marked the trench line lay under a dirty yellow pall. The ground lay quivering as in mortal agony under the hail of staggering blows as the guns quickened their rate of fire up to "rapid fire."

Great blocks of earth shot skyward, shivered asunder and fell breaking into spray like an Atlantic wave that has struck a rock, and flooded the ground with debris.

Puffs of black smoke flashed into sight and slowly dissolved into the general haze, to be replaced by others and yet others. Smaller puffs of white went dancing along the trench tops in hundreds. The eighteen-pounders were working at top speed!

Behind the curtain of vapor great columns of powder and dust belched upwards where the shells had found their mark, spreading outward as they rode. It was as if Nature had thrown up a string of miniature volcanoes. How could mortal man survive such a hellish inferno?

Seven-thirty a. m. Zero hour! At last!

THE greyish black columns of smoke moved slowly forward as though guided by some magic hand. The white puffs followed afterward. And then the ground from which they passed became suddenly alive with men! Over the top!

Clearly I could see our troops as they

The enemy machine gunners were ruthlessly pouring bullets into the backs of our men.

of REVENGE

A lone flyer was detailed to follow the progress of his own advancing troops. Suddenly a nest of enemy machine guns began to pepper the backs of his war buddies. Against orders, the author of this true story followed his own inclination, and found himself embroiled in an unexpected dog fight

clambered over the trenches. The dull glitter of their bayonets showed up through the murk. Dropping down closer to the ground I could even see the strained white faces—with the tenseness of extreme anxiety upon them. On they went, line after line of them, one of the most moving and inspiring sights it has ever been my lot to see.

Still onward they swept! A few short minutes and they had gained their first objective. Not all along the line. There were gaps—I could see that already.

In some places the oncoming khaki wave had faltered. Men fell in heaps in the face of German machine-gun fire. Our bombardment had apparently failed to cut the enemy barbed wire absolutely and completely. I could see men struggling to get through the tangled maze . . . .

Our heaviest shells had failed to pierce the roofs of the deep dug-outs that the Germans had constructed.

As our own barrage lifted I could see the enemy machine gunners bringing up their deadly weapons from the shelters twenty feet below the ground. In some cases, where our men had over-run the first line of enemy trenches, the Germans emerged in the rear of them and shot them in the back.

My time had come to aid! The moment was at hand in which I could help. Down at 200 feet I remember that I had a pang of uneasiness. It was not pleasant flying right in the line of shells which were still pouring from our own guns into Hunland. But fear is most readily banished from the mind when there is much else to think about.

Taking a deliberate sight on the enemy machine gunners who were so ruthlessly pouring bullets into the backs of our men, I opened the throttle wide and eagerly pressed the gun trips on my twin Vickers machine guns.

A steady stream of white-hot tracer bullets spewed forth from the guns, and I had the great satisfaction of seeing enemy gun after enemy gun go out of action as the men operating them were hit.

I opened the throttle wide and eagerly pressed the gun trips. A steady stream of white-hot tracer bullets spewed forth from the guns, and I had the satisfaction of seeing enemy gun after gun go out of action.

Illustrated by Herman K. Bollin

Finally the last gun was silenced, and a feeling of exhileration surged over me, and I zoomed up steeply while the men on the ground sent up a feeble cheer.

I sounded my Klaxon horn, and almost immediately the men in the newly captured trenches lighted their flares to show me their positions. I busied myself marking these in on my map, and when I had completed my markings, I started back to headquarters to drop the map into hands which eagerly awaited it.

A FINAL glance around to check the positions with my new map, and then I turned toward General Headquarters. Then I got a surprise, for about 1,000 yards away to the starboard beam, a German single-seater airplane was climbing out of the smoke. A few seconds later it cleared the smoke and turned toward me.

In those few seconds I had acted also. My precious map was placed in a message bag and securely fastened in a convenient spot from which to throw it overboard if the scrap that was coming looked as though it might turn out unfavorably to me.

Swiftly the enemy plane approached me. It was a tense moment. It was no part of my business to get tangled up in a fight with an enemy plane at this juncture—my first duty was *to get that map back safely.*

I turned to meet the rapidly approaching Fokker, and banked over steeply as he swung in toward me. Then I flattened out . . . . . and once again we were flying straight toward one another.

In an instant he had flashed past me; as he passed he waved his hand. As I glanced backwards, I saw him zoom and turn, and he was sitting right on my tail. That's when the action started!

Before he had a chance to stick his nose down and spray me with bullets I took a long chance and threw my ship into a slow barrel roll, and when the plane finally came under control again, I was pleased to see my adversary immediately in front of me. Instantly my eyes went to the telescopic sights, and I quickly found him within the small circle which spells death to those that get into it. I pressed my gun trips and sent two short bursts of flaming ammunition straight into his cockpit and to avoid me the pilot put his ship into a steep dive—a dangerous proceeding, because a Fokker is famed for its inability to get out of a dive near the ground.

Then back on the stick! Up went that enemy plane into the most wonderful zoom, and before I could do a thing to counter this move I could see and feel the bullets whipping past me, some of them striking into different parts of my plane.

Suddenly a cloud of oily spray broke back into my face, covering my goggles so that everything was blurred. Hastily I pulled them off—just in time to see the red wings of my adversary heading straight for me. I only avoided his oncoming by doing a flat turn.

A quick glance told me that one of his bullets had severed my oil line. That was serious; my motor could not run very long without lubrication . . . . at any moment now it might seize up!

Then there came over me a sudden change. I was seized with a sudden fire of rage. I ceased to care whether I ever got that map into Headquarters or not —my only impulse was to kill that blasted pilot! He was still pumping salvos into me as I jerked the stick back and the nose of my ship went up. I held it there until the plane lost flying speed. As my foe went rushing past and underneath me, my plane stalled and the nose dropped and I was right on the tail of the red-winged Fokker! I drove the stick forward! For the second time I had that hostile plane in the center of my sights; for the second time I pressed the gun controls, and again my bullets raked that Hun from stem to stern!

Down went the Fokker, steeper, ever steeper . . . . until, with its nose pointing vertically towards the ground, it crashed and broke into a sheet of flame.

MY feeling of exultation was short lived! Crack! . . . crack . . . The wind-screen, a few inches in front of my face, shivered, and the clear glass sprayed into a myriad of tiny lines. The aneroid crumpled; it seemed to leer at me horribly from a hole in the middle of its mutilated dial.

I felt sick and dizzy! Yet somehow I seem to remember a green and black plane sweeping by overhead . . . and I vaguely wondered why . . . A long time seemed to pass, and then I realized that my plane was going to crash! Shot down!

All that I seemed able to realize then was that there was a terrible smell of burning oil . . . nauseating. The beat of the motor sounded queerly in my ears. "She's missing badly, Sergeant," I kept repeating.

Instinctively I leaned forward to take hold of the controls again. Then a pain caught me in its grip. I was still in the air! I hadn't crashed yet!

My thoughts turned then to the valuable map that I still carried with me, and I knew that I had to get it to General H. Q. at once, somehow.

Rat-tat-tat-tat-tat! Those cursed machine guns again—where the devil were they at? I became aware that the noise of the motor still sounded dully in my ears. I glanced down and saw that I was over no-man's land . . . . . then the motor conked out altogether, and I subconsciously put the nose of the ship down.

A vision of the brown, beaten, ploughed-up earth came rushing up to meet me, and I made a last brave effort to keep my ship under some kind of control. One hand I kept firmly gripped around the control stick—the other found its way to where my precious map was, and I grasped it and held it above my head . . . . I pulled back on the control stick until it was pressed clear into my stomach . . . . . a spasm of pain . . . . . a sudden jolt . . . . . and I knew no more.

Soldiers came running over to my wrecked plane, and soon they saw the outstretched hand still clutching its vital message. Tender hands removed me from the ruins and soon I was brought back to consciousness by the simple and age-old remedy of having some good brandy forced between my lips!

Medical examination disclosed the fact that I had been grazed by a bullet, and that that was the extent of my injuries. The pulling back on the control stick just as I landed had saved me from any damage, and it was not long before I was looking around for a means of transportation so that I could return to my squadron.

Upon my return I found a notice posted on the bulletin board announcing that I had been shot down and killed, and requesting any and all who cared to, to contribute toward a wreath for me!

Wanting to help a good cause along, I wrote my name down as desiring to donate $25 and then walked into the officers' mess, where my appearance caused great rejoicing. It was speedily decided to spend the money contributed toward the wreath for a big party.

Next morning, we started a series of attacks upon the enemy airmen that culminated in one of the war's biggest air battles. Over eighty planes took part in one mad, hell-raising, roaring dog fight. Richthofen had stepped on our toes once too often.

It will be my pleasure to tell you of that terrible battle in which, I feel sure, some of our own boys were shot down accidentally by British pilots.

Toy Balloon Flies Across Ocean

NEWS of a highly unusual ocean "flight" comes from England. On May 21, a toy balloon, filled with hydrogen, was released at a church bazaar at Caterham, Surrey. It had a label attached which requested the finder to return it. The balloon was returned from New York, by M. J. Israel, who stated that he discovered it on the roof of 107 West 86th Street. Apparently the little rubber bubble beat an uncharted air trail across the Atlantic.

NOTICE

By special arrangement with the manufacturer, POPULAR AVIATION *is offering a free flying model to subscribers.*

If you want further particulars on this unusual offer, refer to the announcement on page 47.

Rain Powder Impossible

A RECENT news item stated that the citizens of Alexandria, Va., were negotiating for the purchase of two hundred pounds of rain-producing powder, the idea being to spray this powder upon a cloud, which would cause the water droplets to join and thus become heavy enough to fall as rain.

In this connection, it may be stated that during an investigation of fog off Newfoundland by the Coast Guard, reliable measurements of the water content of a block of dense fog, three feet wide, six feet high and one hundred feet long, gave less than one-seventh of a glass of water. It would take quite a cloud to produce a rainfall of any benefit, even if it is assumed that none of the water would be evaporated on the descent.

Parachute Falls Faster Than Plane

UNDER the expert hand of Clarence D. Chamberlin, a monoplane designed by him was brought to the ground with a dead motor from a height of 1,500 feet in a longer period than it took a parachute jumper to float to earth.

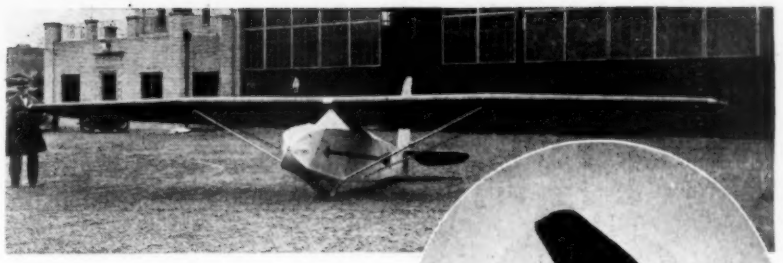
The plane's motor was throttled at the same time the jumper leaped from the plane's cockpit. In fifty seconds the billowy folds of the parachute rested on the ground, but it wasn't until a minute and five seconds later that Chamberlin brought the plane down to a perfect landing.

The famous trans-Atlantic flyer said he wished to demonstrate that while a parachute jumper must land as the wind directs, a plane can be brought to ground safely without the aid of power, wherever the pilot wills.

This Is Real Flying

THE daring German aviator, Udet, in his machine, made the experiment at the airdrome of Berlin.

Udet succeeded in lifting, while flying at full speed, a piece of cloth from the ground, by means of an iron bar fitted with a hook.



This Glider Won Many Prizes at Races

THE Cadet 2 Glider pictured here did considerable to be proud of during the National Air Races. It was entered in nine contests and placed as follows:

1st	place	secondary	spot landing	3 days
1st	"	soaring	duration	2 "
1st	"	secondary	"	2 "
2nd	"	secondary	"	1 "
3rd	"	soaring	"	1 "

The first places won in the secondary contests showed excellent performance, but the two first places it won in the Soaring Duration Contest are an even greater accomplishment since the Cadet 2 is not a soarer, but is a secondary type training glider.

This same glider on July 2nd, flying off the South Mountain at Elmira, N. Y., remained above its starting one hour and thirty-six minutes. This is believed to be an official secondary record.

This glider has a welded steel fuselage, which is covered with aluminum. The pilot's seat is enclosed within the fuselage. It is equipped with an air wheel and brake for a landing gear. The Cadet 2's wing spread is 37 feet, 7 inches. It is possible to put soaring wings on the same fuselage, thus giving it a wing span of 48 feet.

New Power Glider Ready For Market

AFTER experiments covering a period of two years, the perfection of a glider plane, the "air flivver" of the future, was announced by Henry Mattley, President of the Mattley Airplane Company.

According to Mattley, present plans call for the use of a 30-horsepower motor which will give the light craft a crusing speed of 50 miles per hour, and a "ceiling" of from 12,000 to 14,000 feet, capable of clearing the higher mountains. The total weight of the machine, including passenger and engine, gasoline and oil, has been estimated at approximately 600 pounds. The gasoline consumption, Mattley states, will be approximately two gallons per hour.

Mattley states that the Continental Motor Co. is now building a special engine for this type of craft to be installed as soon as production is started. The plane is to be a one-passenger, cabin monoplane, approximately five feet in height.

Unusual Crack-Up

BROOKS FIELD, San Antonio, Texas, was the scene of an unusual crack-up several days ago. An A-3B airplane, piloted by Lieut. Frank F. Everest, Jr., of Fort Crockett, Texas, in attempting a landing, pounced upon a PT-3 airplane of Brooks Field, parked on "dead line," and occupied by Lieut. H. S. Sanders, pilot, and Cadet Miles, passenger.

The tail and right wing of Lieut. Sanders' plane was wrecked. Lieut. Everest, in explaining the accident, stated that he was under the impression that Lieut. Sanders was preparing to taxi from the line, and so attempted to land in place.

Page Wears New Helmet

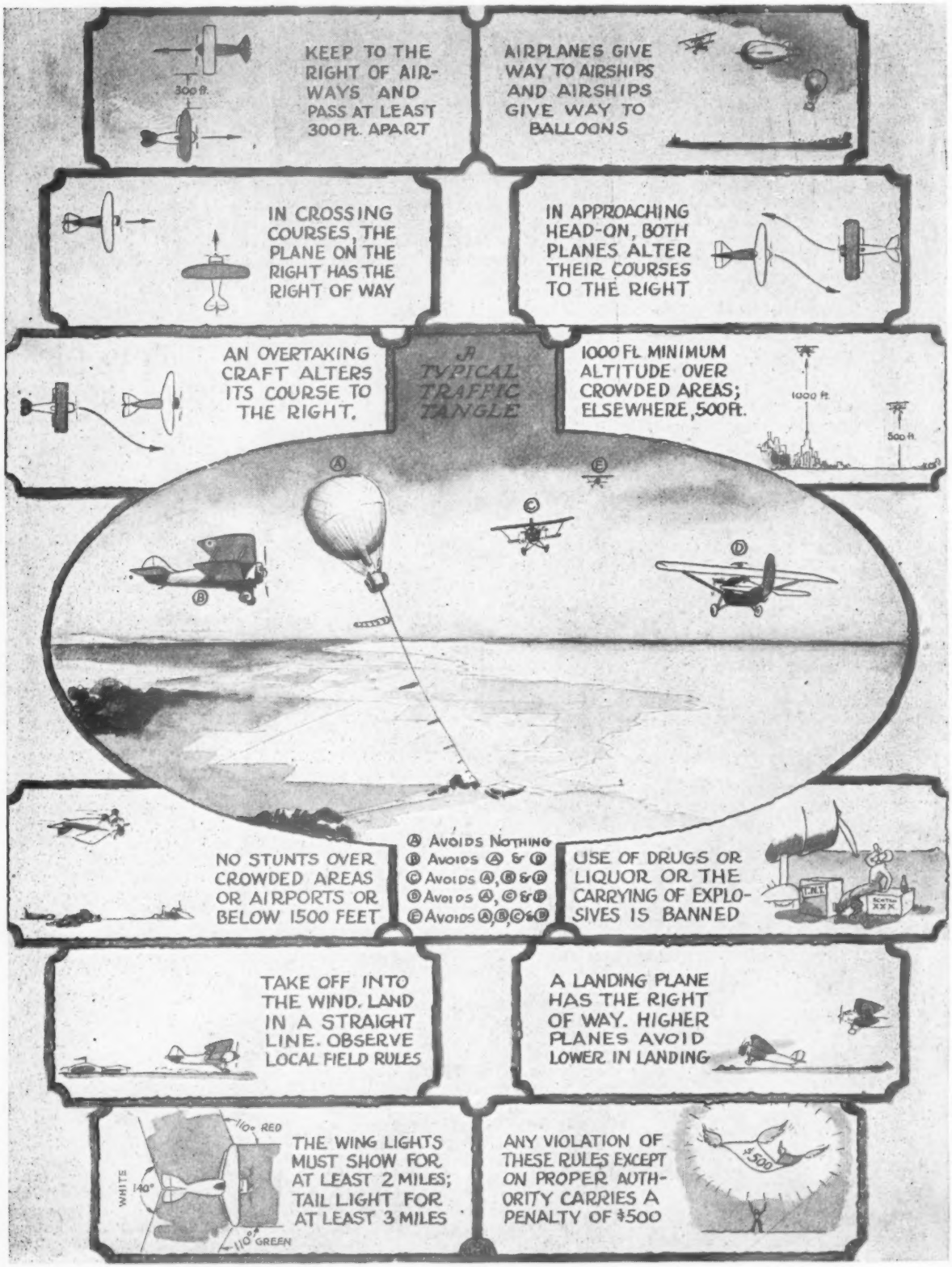
CAPT. A. H. PAGE, Marine Corps aviator, seen looking at the radio beacon detector finder which guided him on his record-breaking blind flight from the middle west. It is through this tiny instrument that the pilot is guided.

Capt. Page is also wearing the latest design air helmet with ear phones to hear messages broadcast from the ground.

A short time after this picture was taken Capt. Page lost his life when he crashed while leading the Thompson Trophy Race at the National Air Races.

AIR-TRAFFIC RULES

As contained in the Air Commerce Regulations


300 ft.
KEEP TO THE RIGHT OF AIR-WAYS AND PASS AT LEAST 300 Ft. APART
AIRPLANES GIVE WAY TO AIRSHIPS AND AIRSHIPS GIVE WAY TO BALLOONS
IN CROSSING COURSES, THE PLANE ON THE RIGHT HAS THE RIGHT OF WAY
IN APPROACHING HEAD-ON, BOTH PLANES ALTER THEIR COURSES TO THE RIGHT
AN OVERTAKING CRAFT ALTERS ITS COURSE TO THE RIGHT.
A TYPICAL TRAFFIC TANGLE
1000 Ft. MINIMUM ALTITUDE OVER CROWDED AREAS; ELSEWHERE, 500 Ft.
1000 ft.
500 ft.
A
B
C
D
E
NO STUNTS OVER CROWDED AREAS OR AIRPORTS OR BELOW 1500 FEET
A AVOIDS NOTHING
B AVOIDS A & D
C AVOIDS A, B & D
D AVOIDS A, C & E
E AVOIDS A, B, C & D
USE OF DRUGS OR LIQUOR OR THE CARRYING OF EXPLOSIVES IS BANNED
TNT
SOUTH XXX
TAKE OFF INTO THE WIND. LAND IN A STRAIGHT LINE. OBSERVE LOCAL FIELD RULES
A LANDING PLANE HAS THE RIGHT OF WAY. HIGHER PLANES AVOID LOWER IN LANDING
110° RED
WHITE
140°
110° GREEN
THE WING LIGHTS MUST SHOW FOR AT LEAST 2 MILES; TAIL LIGHT FOR AT LEAST 3 MILES
ANY VIOLATION OF THESE RULES EXCEPT ON PROPER AUTHORITY CARRIES A PENALTY OF $500
$500

500 m. p. h. *Can* Be Done!

Mr. Rathbun has startled readers everywhere with his statement that 500 m. p. h. could *not* be done. Army and navy officers, instructors, engineers, and speed-plane designers have flooded us with unsolicited manuscripts to prove that 500 m. p. h. *could* be done. Read their objections. Mr. Rathbun will answer his critics in the December number. Watch for it!

IN the September issue of POPULAR AVIATION, John B. Rathbun came out with the unbelievable information that "500 M. P. H. Can't Be Done."

Now Mr. Rathbun's statements cannot be ignored. He is an eminent aviation authority, a pioneer, and the author of several recognized textbooks on aviation.

As soon as his article got into the hands of readers, we were flooded with letters—people who said Rathbun was stupid, crazy, impractical.

Several readers sent us rather complete manuscripts refuting the contention of Mr. Rathbun. Our limited space does not permit us to quote in full the various arguments against Mr. Rathbun's theories—but we will give you some of the most outstanding points brought out in an effort to show that 500 m. p. h. *can* be done.

Mr. Rathbun is now preparing a manuscript which will answer all the various arguments against his theory. There is not space to include his answer in the present issue—but watch for the December number! Mr. Rathbun will not let a single argument go unanswered—while most of us sit on the side lines as the scrap goes on.

One of the first dissenting letters came from Hugh L. Thompson. Mr. Thompson is the head of a firm of areonautical consulting engineers.

"Your recent article by John Rathbun, stating that it is impossible to travel 500 miles per hour," says Mr. Thompson, "reminds me of a book I read some time ago, that was written about one hundred years ago. The writer proved convincingly that no machine could go 30 miles per hour and that no human could withstand such terrific speed and live.

"Mr. Rathbun says 500 miles per hour can't be done and yet we are doing it in other ways today and will be doing it in the airplane in a few years. We might go into engineering proof in reduction of friction and the dissipation of heat, and the fact that engines are being built lighter and more powerful every day. However, this is not necessary. Let's take a few simple examples:

"The deer fly is said to travel at a rate of 800 miles per hour and it is a living creature! Steam passes through turbine blades at the rate of 1225 feet per second or 830 miles per hour. There is friction there. The steam is doing work against the blades and there is heat but the turbine doesn't burn up. But here is one still better. We have 9 ft. propellers that turn 2000 r. p. m. This means a tip speed of 56,000 ft. per minute or 642 miles per hour, and who ever heard of a propeller melting or catching fire from its friction in the air?"

LOGAN C. RAMSEY is a lieutenant in the U. S. Navy and has been a naval aviator for ten years. In addition, he has written a textbook on "The Navigation of Aircraft," and is now an instructor at Pensacola.

If you read the article on Naval Aviation last month you will know that Pensacola is the place where all naval aviators are trained in aerial navigation, instruments and history. Let's hear what Lt. Ramsey has to say:

"More than once in the history of the world, mathematicians and scientists have published mathematical 'proofs' of impossibilities that have later developed into stern realities. One scientist 'proved' by mathematics that an ocean steamer, in order to cross the Atlantic under its own power, would have to carry such a load of fuel that the boat could not remain afloat. Yet the Atlantic was crossed by a steamer during that scientist's lifetime.

"Two examples of velocities in excess of 500 miles per hour are available for the refutation of Mr. Rathbun's conclusions. The first of these is the published statement of a group of Brazilian scientists as to the speed of flight of a deer fly native to that part of the world. This fly, according to these gentlemen, attains a speed in flight of 815 miles per hour! If Mr. Rathbun's figures of that 3,000 degrees rise in temperature at 500 miles per hour are correct what a wonderful cooling system that fly has!

"Very recently a metal propeller 10 feet in diameter has been turned upon a propeller test stand for several hours at 3,000 revolutions per minute. That meant that the tip of the steel propeller was cutting the air at 3,000 times 10 times 3.1416 feet per minute.

"Translated to miles per hour this means that the tip of that steel propeller was traveling through the air at a speed of approximately 1,070 miles per hour! The conclusion that the rise in temperature at high speeds is somewhat less than that calculated by Mr. Rathbun appears quite logical. Therefore it follows that the heat engendered by the air resistance would not burn up the present type of plane and that speeds in excess of 500 miles per hour are theoretically practicable for modern aircraft.

"Exactly what power such an engine would have to develop is more or less problematical but in consideration of the fact that an engine of about 900 horsepower has been able to give a speed of approximately 360 miles per hour to a plane and that the power required varies with the cube of the speed, an engine of 2411 or say 2500 horsepower appears adequate.

"The writer will take the risk of predicting that human beings will achieve a speed in excess of 500 miles per hour, provided that such international aircraft speed contests as the Schneider Cup Race are continued, within the next ten or fifteen years."

MR. RATHBUN will have his hands full answering Lt. Ramsey. But if you will note the editor's comment in "The Airy Chat with the Editor," Mr. Rathbun gives you a hint as to why the speedy propeller tip does not contradict his theory.

The Naval Air Station at Pensacola seems to be quite touchy on this question of whether 500 m. p. h. can or cannot be done. Waldo Tullsen, Lieut. (J. G.) U. S. N. of Pensacola, thinks Mr. Rathbun was only fooling and goes on to prove how ridiculous Mr. Rathbun's contentions were:

"After reading the recent article by John B. Rathbun in POPULAR AVIATION," says Lt. Tullsen, "I am moved to disagree very strongly with his line of reasoning. It reminds me a little too much of the no doubt well meant debates some years ago on the impossibility of flight, or the belief of many people that if a parachute jumper did not pull the ring at once, he would lose consciousness. Their reasons looked well on paper, I have no doubt, and superficially Mr. Rathbun's seems plausible.

"His first claim is that a rifle bullet reaches a high temperature in flight at the average speed of 1,200 to 1,500 m. p. h. I do not agree with this. I am quite certain that a naval projectile is exposed to no such temperature as is given by the use of Mr. Rathbun's formula.

"I have been present at target practices for a number of years, at ranges varying from ten to twenty-five thousand yards, where the time in the air may be forty seconds or longer. The

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fuses used have never, to my knowledge, been injured by the intense heat that we are assured by Mr. Rathbun would heat the surface to incandesence, being three times the speed of 500 m. p. h. at which our racing plane would reach dangerously high temperatures. And using his formula of either V^3 or V^4, this would give either 27 or 81 times the temperature of incandescence!

"And I have seen them land after being in the air for 30 or 40 seconds. Nor have I, when watching night firing, ever seen one heated to a point where it was visible because of air friction.

"However, here is a harder nut to crack. According to information on the German long-range gun, the initial velocity was 5400 f. p. s., falling to 2450 at the end of its 75-mile trip. Taking 4000 ft. per sec. as an average for the time it was in the denser part of the atmosphere, we get some interesting figures to try out on Mr. Rathbun's formula.

"The figure to put in the formula is 4000 ft.; reduced to m. p. h., is 2730 m. p. h. This is over a thousand miles faster than the figure he erroneously gives as the speed of meteors entering the atmosphere. I would like to know the authority giving 1600 m. p. h. as the speed of meteors.

"I have looked this point up in the four or five texts on astronomy available here, and they agree fairly well on a figure of ten to fifty miles per *second*, or 36,000 m. p. h. or above! A textbook by Young on astronomy gives an estimated figure of two miles per second at which a meteor may retain its crust; in other words, a meteor slowed to less than this figure should reach the earth's surface intact. Two miles per second is 7,200 m. p. h.

"However, I will make several admissions. My deductions on projectiles is drawn mainly from negative sources. In other words, having studied gunnery and ballistics, and knowing the main factors that enter into a projectile's flight, I have *never* come across any point where the heat generated by friction is mentioned. This should occur in fuse design if at all, since a fuse is a delicate gadget.

"And what a remarkable fuse the Germans must have had, to withstand a velocity of above 2,500 m. p. h. for three minutes if Mr. Rathbun's formula is true. So whether the reasoning I have deduced from the above has flaws in it or not, I will allow Mr. Rathbun's formula to bring its own downfall upon itself.

"But when Mr. Rathbun closes his rather sensational article with a single paragraph on the power question, I find myself thoroughly in agreement with him. Unless some radical changes in planes, power plants, or both, occur, I expect to be considerably older before the speed of 500 miles per hour is reached—especially when we know that the average plane uses half its power to go places, and the other half to pull through the air by main force a flock of struts, wires, fittings, wheels, axles, angles and other assorted gadgets.

"Whatever type of plane first reaches 500 miles per hour, whether a streamlined flying wing, or some other type, of one thing I am certain. It will not be that aerodynamical monstrosity known as a tri-motored transport."

AS we go on, Mr. Rathbun seems to be more and more in the wrong. But, take heart, for he has promised not only to disprove the various objections, but also to support his own conclusions with those of several other internationally famous authorities.

Next we have the comments of A. R. K. Mr. "K" is a great admirer of Mr. Rathbun, or at least he was until he read that provocative article in POPULAR AVIATION.

"I have just read in your September issue the article '500 M. P. H. Can't Be Done,' by John B. Rathbun," says Mr. K, "with the result that Mr. Rathbun's stock dropped about 75% in my estimation, as I have his book on airplane construction. Your magazine has likewise lost a little prestige with me for publishing such an article.

"The article is even worse than Sunday Supplement articles which the author criticizes, for no one really takes such articles seriously anyway, but in a magazine such as yours one would expect greater accuracy based upon sound scientific information.

"He very conclusively proves that an object of certain streamline form of minimum resistance passing through the air at an altitude of 5000 feet at the rate of 500 m. p. h. would, due to air friction, become hot enough to melt steel. He has apparently forgotten that a propeller tip may exceed that speed for hours at a time.

"In the parlance of the street the formula is all wet, as it has overlooked one of *(Continued on Page 54)*

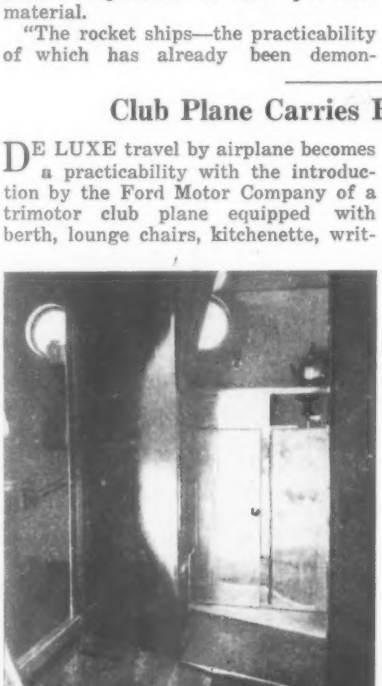
Stearman Predicts 25,000 M. P. H.

"IN 1980 we'll have rocket-shaped aircraft that will travel at such speed they'll be able to circle the earth in an hour," recently predicted Lloyd Stearman, president and founder of the Stearman Aircraft Company of Wichita, Kansas, in an interview in Denver. "Aircraft then will be constructed in the shape of rockets, much like the type of toy rockets we use on the Fourth of July, and will be propelled by blasts of gas formed by successive explosions of some powerful material.

"The rocket ships—the practicability of which has already been demonstrated by experiments in Germany—will be made of a light metal alloy for which gravity attraction will be small. The ships will speed above the air strata, about six to eight miles high, to eliminate friction of air, which at the intense speed at which they will travel would set them on fire at lower altitudes. The ships will be airtight, and those within will be fed their air from stored oxygen. The speed of 25,000 miles an hour which I predict will be developed for aircraft in fifty years," concluded Mr. Stearman, "will enable aviators then to circle the earth twenty-four times in as many hours."

Club Plane Carries Bathroom and Kitchen

DE LUXE travel by airplane becomes a practicability with the introduction by the Ford Motor Company of a trimotor club plane equipped with berth, lounge chairs, kitchenette, writing desk, loud speaker radio and other conveniences of the club or yacht.



One of the most interesting features of the plane is the kitchenette situated just opposite the entrance door and partitioned off from the rest of the cabin. Though compact, it is fully equipped to prepare and serve an elaborate club luncheon.

A combination aluminum sink, drainboard and hot plate with shelf and closet space above and below provides the working place for the chef. Water is supplied from an overhead tank with gauge to indicate the amount available. The hot plate is heated by Pyrofax, a concentrated gas carried in a tank concealed in a small cabinet.

Just behind the kitchenette in the rear of the plane is a lavatory where the careful attention to detail is again evidenced. This compartment contains a toilet, wash bowl supplied with running water from a special tank, towel rack, container for soiled towels, soap dispenser and mirror. On one side, partitioned off by a curtain, is a small space which can be used as a clothes closet, golf bag container or gun rack.

FAMOUS FLYER BRINGS AID TO ISOLATED VILLAGE

Dying Child Saved by Intrepid Airmen

JUNE McGILVRAY, 9-year-old child living at Puget Island, 89 miles from Portland, Ore. was near death from pneumonia due to lack of medical aid. Communication with the isolated village in which she lived had been blocked for 12 days because of huge blocks of ice in the Columbia.

For five days death had grinned at June McGilvray, who makes her home with her grandfather and her great-grandmother on the doctorless island. For five days a frantic mother and father on the mainland had fought the frozen river to send a physician to the island while snow and ice made the countless efforts to cross the Columbia of no avail.

Then a Portland newspaper, the Oregonian, seeking news of conditions due to the unusually severe storm, in outlying communities, learned of the seriousness of the medical situation at Puget Island where June McGilvray lay at the point of death and five others were seriously ill with influenza or pneumonia. Although a food and fuel shortage threatened also, frantic villagers in the little hamlet of 1000 begged first for a physician.

Chartering a plane of the Rankin Flying Service with Tex Rankin, eminent aviator, as pilot, the newspaper asked the aid of the City and County Medical Association of Portland and Multnomah county. Dr. Boylen at once offered his services in the face of the grave danger of the trip through bitter winds and pelting sleet. Even though the trip itself was made safely, the two men knew that the gravest danger presented itself at Puget Island where a landing on rough ice or rocky shore offered a potent possibility of death or injury.

Taking off from Portland, however, in gathering darkness, the pilot forced his way through bitter cold and powerful winds, following the course of the Columbia to get to Puget Island. Circling the island in search of a landing spot ashore or on the ice, Rankin was guided to the best spot the island had to offer by fires fed with precious fuel by 200 anxious villagers. He sideslipped the biplane, a Great Lakes training ship equipped with skiis, over the near line of trees and set her down on the field of snow, the skiis breaking through the slippery crust and bringing the plane to an abrupt halt.

As soon as the plane landed, a waiting automobile rushed the physician to the bedside of the McGilvray girl, for whom the villagers had abandoned hope until word of the coming airplane reached them. Dr. Boylen arrived with the crisis in the girl's condition so that his treatment was in time to win the fight for her life. All night the physician spent between the bedside of June McGilvray and other sick persons on ice-bound Puget Island, diagnosing each case and leaving precise instructions for the care of each.

Tex Rankin, left, and Dr. Boylen at the start of their heroic flight.

At dawn the grateful fisherman-farmer folk turned out en masse to clear away brush and break down the snow crust to allow room for the take-off. They remained at the field until Rankin made a solo take-off to ascertain if it was possible to lift the plane above the threatening line of trees and then returned to take aboard the physician.

Not only did the arrival of the plane save the life of June McGilvray but it rid a fear-grip community of its terror of death and inability to cope with the situation.

"Hope of all immediately soared when word reached us that the plane was coming with medical aid," said Jack Maughan, local manager of the telephone company. "When Rankin landed safely on the only cleared space we could find, you could feel the tension break."

Dr. Boylen, whom Rankin praised as a man of iron nerve in the air and brisk efficiency as a physician, was voluble in his praise for the pilot.

"He set that plane down in the dark, the tiny field lighted only by the glare from fires built by several hundred villagers around the edge of the clearing," said Dr. Boylen. "The landing space was small and additional hazard was offered in the trees that hemmed in the field. I know little about flying, but I know that landing was classical."

New Light Metal Discovered

EXCESS weight, that bugaboo of aeronautics, will soon be disposed of, through the discovery of a cheaper process of manufacturing beryllium.

Beryllium, which up to the present time cost approximately $100 a pound, will be available at $4 the pound—and promises to play the chief role in the future construction of airplanes.

Alfred Schwarz, metallurgist, developed this process of manufacture. Previously, nineteen operations were required to extract pure beryllium from the minerals in which it is found—chiefly beryl, chrysoberyl and phenacite. Mr. Schwarz's process requires only one operation for beryllium oxide—the next step to the pure element.

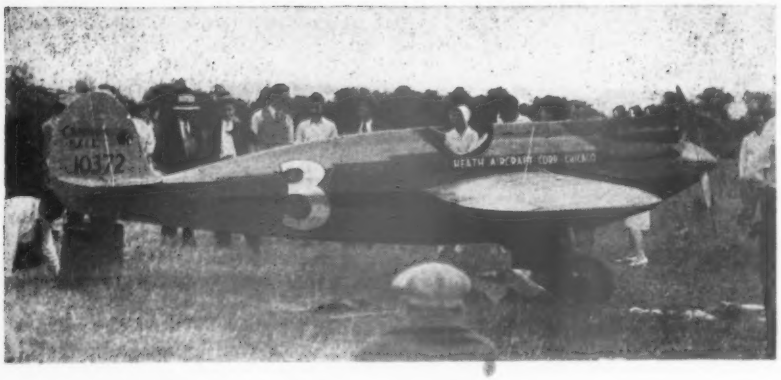
In general, the vital parts of an airplane—the fuselage engine mount, landing gear, spars and fittings—are made of steel. By substituting beryllium alloy for these vital parts, the pay-load of a standard plane can be increased from 65 to 100%, without sacrificing structural strength. For example, a ship now carrying 4500 pounds pay-load would, if constructed of beryllium, carry 7550 pounds or about 16 additional passengers.

Beryllium not only resists decay, but is considerably lighter than the lightest metal now undergoing the strenuous test of flying. Its weight is only 25% of that of steel and its tensile strength is 85% of that of steel. Despite its amazingly light weight, it is hard enough to scratch glass and its elasticity is four times that of aluminum.

German Plane Controlled Entirely by Hands

THE photo shows the new "Arado" airplane, developed in Germany. This plane has the seats of the pilots arranged side by side and not as in other small planes where the seats are one behind the other.

The steering mechanism is done by the hands. No foot controls are used whatsoever.



Aviators Must Learn Special Language

EXPERIMENTS by engineers of the Army Air Corps at Rockwell Field, Coronado, California, concerning radio-telephony have resulted in the formation of a new language to be used by army airmen. It was discovered that the roar of the motors and disturbances in the air cause noises which are a considerable handicap when it is attempted to carry on a conversation. Certain words were found to eliminate the trouble. Consonants especially were difficult to hear or distinguish, it was ascertained, unless vowels predominated.

Five hundred words were first chosen for an elimination test under actual conditions. Subsequently this number was cut to 100. Army officials point out that a misunderstanding in messages could cause a great deal of damage in the air. A list of words that have been found favorable includes "right," "left," "stop," "okay," "good," and "hit." Regular use of radio-telephony is now being practiced and it is no longer a mere experiment.

THEM WAS THE DAYS!

A Brief Glimpse of the Hectic Days Before the War

FRED DE KOR will fly today (weather permitting), in his new triplane! Admission to the field 25c.

Thus—and more at length—read the startling notice. Startling so few years ago. Crowds gathered about the strange craft like bugs about an evening lamp. It was necessary to rope off a runway to take off, to keep the eager crowds from walking into their own destruction.

From miles around came people, in the chugging automobiles and horse-drawn carriages, buggies, farm wagons; on bicycles and afoot.

And — *weather permitting* — some mystic mechanics did this and that to the awe-inspiring engine that was to take that "derned contraption right into the air, like a bird." The aviator—that's what they called "them there flying fellers"—went over his ship with much pomp and flourish.

The signal was given. The men at the restraining ropes gave a louder vociferation to keep back, stop pushing, quit shoving—or they'd have to call off the flight. The asthmatic engine rattled to speed, and dust was miraculously kicked up from the stubble field.

Whee! It was moving. MOVING. Look at 'er!

The craft jostled into the afternoon breeze; rumbled over the weedy ground; careened, righted, and—it was—look at it!!

It jumped clean offum the ground! Wow!

Now look!

Right into the air—for a whole second.

Another bounce. A bigger one.

Gosh aw hemlock! Jimminy crickets! Lickety split! It's clean in the air! Look at 'er!

The crowd was a bit wild. Awed. Some mute—speechless. Others yelling; especially the kids. Hats went sailing into the air. Coat tail snapped as some rustic did a hoedown.

Up. Up. Nearly a hundred feet now. Higher than any building. Even the church spire. Higher'n a kite. Oh, you kiddo! Daredevil Jones wished he were in the ship.

The town band strikes up, "There'll Be a Hot Time in the Old Town Tonight."

Too bad Uncle Joe's rheumatism was so bad. He'll never realize what he's missing.

Around the sky—like a hawk circling—the three-storied ship sailed. Wonder if it wouldn't be better to have some more stories to them there wings. Maybe it could fly clean up to the top of the sky then. And looks like they'd ha' thought o' putting another windmill of a thing pointing straight up, to help lift the airship. With wide eyes they watched the thin-winged triplane clear the tallest buildings. The I. O. O. F. Hall. Even flew over the church spire. Fifty feet over it. Si Simkins, who works down at the livery stable, wants to bet anybody he's over fifty feet—and leave it to Judge Walker over there sitting in his EMF four-door touring car with that one-man top let down (though it took three men to lower it; two aldermen and Jess, the blacksmith).

For five minutes — think of it! What'll they be doing next! For five minutes the airship stayed up in the air. Flew clean over town. And now it is landing. The men with the ropes are frantic again with the crowd.

But only Squire Harkwell's little nephew, Jimmy, was hurt in the scramble. And he's bawling mostly because he spilled his molten ice cream from his cone.

For hours they linger around, looking on—gawking, making smart sayings (as wisecracking once was)—feeling of the marvelous thing. And some trying to steal a part of the mysterious workings for a souvenir.

Them was th' days!

Heath Cannon Ball Makes 118 M. P. H.

THE picture (left) is the Heath Cannon Ball that won event Number 7 in the 275 cu. in. race at the National Air Races. The average speed of this winner was 118.25 miles per hour. Rather a nifty-looking ship Heath puts out, isn't it?

Buy a Plane and Get Your Silverware Free

NOW silverware has become an essential feature of airplane equipment! Those giant tri-motored private yachts and transcontinental liners of the air that are launched at Dearborn, Michigan, by the Stout Metal Airplane Company division of the Ford Motor Company, now take the air for delivery to their new owners all equipped with a set of silverware. They have neat racks to keep it in when not in use, a set of modern glassware dishes to go with it and commodious portable tables for the service of meals en route.

Planes Used to Trap Crows

OUT in Nebraska planes have been used recently in aiding farmers in their fight on crows, which had been doing much damage to the crops. Before planes entered the combat, the crows would fly away from the woods just as soon as men with shotguns would start hunting for them. But when an airplane was employed to circle low over the trees, the crows became so badly frightened they refused to leave the trees in spite of barrage after barrage from the shotguns. The result was a wholesale slaughter of crows and a much better corn crop in certain parts of Nebraska.

MAKING A LIVING *at* BARNSTORMING

By EDWARD PALMES SHURICK

Are you thinking of becoming a Barnstormer? Would you like to fly around from town to town, making money as you fly? This article will give you some valuable hints on how to build up your trade

THE barnstorming days of yesterday are events of the past. Ask any transport pilot and he will verify what I say. During the past few years thousands of people have taken short flights for no good reason whatever, except that of curiosity. The airplane has now become so commonplace that this kind of passenger traffic cannot continue. The lone pilot can no longer circle over the housetops of a strange city, do a few "barrel rolls" and other "stunts," draw out a curious crowd and then set down for an afternoon of carrying passengers at anywhere from two dollars to five dollars a ride.

And yet, for every passenger that rode a year ago for "fun" there will be ten or more who will ride for sane pleasure, scenic enjoyment or business necessity.

A pilot, after he receives his Transport License, can carry passengers for hire, providing he can find the passengers. Airplanes are sold on time and to make the monthly payments certain, the pilot or small operator must be taught how to keep his plane in the air. A plane on the ground is a liability.

The material gathered by the writer for this article came through actual experiences in the field. During the numerous state tours conducted by him he has proved what highly organized methods of publicity will do for aviation. These outstanding examples have all been actually tried out and any one will add dollars to the yearly profits of the small operator.

Before presenting the numerous sales ideas to you, I want to say a word about safety. Safety is the all important feature of flight. An accident to a plane during one of these events will tear down your reputation as a flier—a reputation you will find difficult to rebuild. Learn to land well, and when flying before a group of people, pay particular attention to your landings. Where the ground is rough, operate your controls as if you were on imaginary ground three or four feet above the actual ground and then "pancake" down. Do not let the ruts swing your plane. Hold the rudder bar tightly between your legs. A perfect landing will inspire confidence, which means more passengers and greater profits.

THE management of a one-plane flying business is just as important as that of an organization operating a number of planes.

First be careful in selecting a name. Many times a name has been responsible for the success or failure of a business. I have in mind two boys from Beaudette, Minnesota. One was named Paul and the other Peter. The combination of the two names brought to mind the Apostles of the Bible, so they adpoted the usual, but clever name, "Peter and Paul, the Flying Apostles of Aviation." It went over big and through playing it up over the microphone at the Brainerd, Minnesota, airmeet, I was able to help the boys make over $180.00 in one afternoon. Pretty good for a three-place, open, OX5 job.

Keep away from such names as the "Thirteen Black Cats," the "Flying Witch," etc. They do not inspire confidence. Here are a few suggestions for names that have a "Showman" value: "The Flying Eddies," "The Flying Fool," "The Speed King," "The High Hats," "The Flying Musketeers" and, "The Flying Dutchman."

Have a regular letterhead, neatly printed. Your business cards should be distinctive. Get out a little folder entitled "Fly without Fear." In it, stress safety in flight.

E. P. Shurick. Director of over 30 Airmeets. Business Analyst, specializing in Aeronautics.

The Punchboard Tour

THIS idea has its legal limitations. in some states the use of punchboards is forbidden as it constitutes a form of lottery. Never use the mails to promote a punchboard tour. Better have a good attorney investigate the law in your locality before starting out to organize a tour of this kind.

The first step is to select a list of six cities, not over fifty miles apart. Visit the city in person. See the mayor and chief of police. Tell them you have a plan by which they can raise considerable money for the improvement of their local airport. Punchboards with your name on them can be purchased from concerns in Chicago and New York. They cost 25c each. The board should contain 100 punches. This copy should appear beneath your name, near the top of the board:

WIN A TWO DOLLAR AND A HALF RIDE

In the Punchboard Airplane that arrives in this city (name day of week) afternoon of every week. In case of rain your ticket will be good the following week. Twenty-five cents a punch. Get your ticket now for next week. Proceeds go towards improvement of your local airport.

Mr. Shurick was the creator of the World's First Flying Orchestra. Here we see the little group, stretching their legs after landing in a town where they had a scheduled engagement.

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Get the American Legion Post to sponsor the event. A punch sells for twenty-five cents. Of this sum, fifteen cents goes to you, five cents to the store or merchant that features the board and five cents towards the airport. At least eight of these boards should be placed with cigar stores, pool rooms, drug stores, etc., in each city. The board has a value of $25.00 and seven ride coupons go with each one. If all eight boards are sold out, the day you arrive the account stands as follows: $120.00 to you, $40.00 to the merchants, $40.00 to the airport.

Begin your punchboard tour on Tuesday mornings of each week. Fly to the first city on your schedule. This same city should be visited each week on the same day. This is very important. You continue in this manner throughout the week with the exception of Mondays when you remain at your home airport for repairs to your plane.

As you fly one city daily, six cities a week, you can get some local merchant in your home city to send his salesman with you, at say ten cents a mile. This will pay for your mileage between points.

Independence Day Bomber

THE Fourth of July and Armistice Day are big events in the life of a small community. Select a list of eight cities of 5000 population or under. Call on or write to the mayor. Make him the following proposition:

You will fly over his city at such and such an hour on the Fourth of July or Armistice Day, releasing at least fifty small paper parachutes to which are attached tiny American flags. These can be secured in Chicago or New York. After dropping the parachutes you will give the crowd an exhibition of stunt flying. Following this you will fly over an object (a box covered with white cloth) placed by someone named by the mayor, in the center of the field. You will drop small bombs at the object (paper sacks filled with flour or lime), giving a demonstration of warfare.

Start on your trip about 11 o'clock. The cities should not be over twenty-five miles apart. Spend about a half hour over each city. By holding to this schedule you can make the eight cities and return to your home field by dark.

We have found that it is possible to get $50.00 from each city for this feature. This will give you a total of $400.00 for the day's work.

It will be best for you to break the trip by landing several times. Do this between the cities as it spoils the effect if you land at the city in which you have the contract.

The Flying Santa Claus

I PRESENT in this idea a new plan suitable for Christmas time. It calls for a three-place cabin plane.

Arrangements should be made early in October. Lay out a route through the southern part of the country, selecting cities of ten thousand or more. They should not be over 50 miles apart. Go to the public library in your city and get a copy of the Newspaper Directory. Select papers that have the second highest circulation in each city. Submit, by letter, the following proposition:

You will bring the Flying Christmas Airplane to their city, arriving there either in the morning by nine o'clock or in the afternoon by two o'clock. This will vary with each city, as it is planned to make two cities a day on the trip, excluding Sunday.

In the plane will be Santa Claus in full attire. The plane will land at the airport where the newspaper will have an open car waiting. Santa Claus will be driven uptown, through the main streets of the city, to two stores that have been determined upon in advance by the paper. Here he will meet the "Kiddies" in the toy department.

Before landing at the airport, Santa Claus will release fifty small paper parachutes, each containing a small present for children.

Prior to the arrival of the Christmas ship, the newspaper will conduct a contest open to the young people of their city. This will be in the form of a competition for the best worded letter on the subject, "Why I Love Santa Claus."

The four best letters received will be awarded prizes which will consist of four free rides with Santa Claus in the Flying Christmas Plane on the day of his arrival. These rides are given just before the plane takes off for the next city. Sundays, the Flying Christmas Airplane will devote the afternoon to selling rides for little folks to fly with Santa Claus on an inspection trip of the chimneys throughout the city. These rides readily sell for $2.00 each.

The tour will begin about the 27th of November and continue on up until December 20th. The cost to the newspapers should be $75.00 a city. This will give you the sum of $150.00 a day for the tour. Two boys that tried this idea out last Christmas cleared up a total of $1520.00 net profit after expenses were paid.

The newspaper divides the cost with the two merchants where Santa Claus appears. Decorate your plane with holly and evergreen.

The Trade Booster

THIS idea was carried out very successfully during 1929. Prepare a lisat of the following industries in your city: These must be *Wholesalers*, not *Retailers*. Ladies' Ready-to-wear, Men's Furnishings, Drugs, Dry Goods and Notions, Furniture and House Furnishings, Millinery, Hardware and Radio. This will give you a seven weeks' tour. Every large city has what they call a trade area. Take Rochester, New York, for example. The trade area there embraces the cities of Batavia, *(Continued on Page 60)*

Street Car Paces Plane

HERE is a plane which has to travel at its high speed in order to keep up with a street car.

The fault is not with the plane. The electric car is traveling 90 m. p. h. and the "Pathe News" camera is trying to keep up with it in the plane overhead.

This electric car is reported to be the fastest in the world and is being used for interurban service near Dayton, Ohio.

Airplane Used as Hearse

THE airplane has been put to many and varied uses both in peace and in war, but for the first time in the history of the Rocky Mountain region an airplane was recently used as a hearse.

John E. Fitzsimmons of Denver died in Walden, Colorado, a tiny snow-bound mountain city. Roads were blocked by snow and railroad schedules were disrupted. So the Olinger Mortuary of Denver chartered a Fokker monoplane of the Midcontinent Air Express to make the trip.

After the seats had been removed from the cabin of the plane, to make room for the body, the ship hopped off from Denver with Neil T. McMillan, Western Air Express air mail pilot, at the controls.

After a 150-mile flight over rugged mountains and lonely plains, McMillan landed at Walden, where citizens had built a smudge fire in the middle of the field, so that the pilot would be guided by the smoke.

The corpse was loaded into the plane, and the pilot arrived back in Denver after exactly three hours in the air.

As the body was transferred from the airplane to the hearse, photographers gathered about the scene, moving picture cameras were cranked, and a large crowd assembled to watch the unusual proceedings.

Plane Saves Life

AN airplane, pitted against the Grim Reaper in an angel of mercy role, recently was instrumental in saving the life of a Cooperstown, N. Y., woman, who had been stricken with blood poisoning as a result of stepping on a rusty nail.

Unable to obtain anti-toxin for his patient, Mrs. Essie Crossway, 40 years old, in Cooperstown, Dr. Gray Carter phoned a druggist in Binghamton, N. Y., who chartered the American Eagle airplane of J. N. Woodworth for a rush trip to Cooperstown.

There is no airport at Cooperstown but Woodworth landed on a golf course and was met by a motorcyclist who speeded the anti-toxin to the Mary Imogene Bassett hospital in time to save the woman's life.

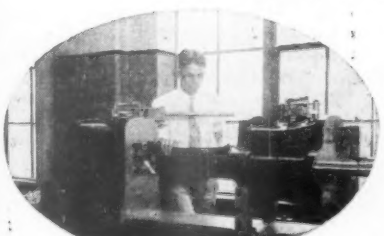
Boy Well Versed

YOUNG America is well versed in the vernacular of aviation, even more so than middle-aged America. Take for example the story that Pilot Lamar Nelson, former World War flyer, tells of his son:

"While piloting planes for a company over the Grand Canyon, my six-year-old son had his leg broken in playing on the field. I realized he needed expert medical attention and decided to fly him to Phoenix.

"The trip was made easily, and while slipping down to make a landing I thought it better to make the smoothest one possible, so as not to jar my boy's leg. Intent on my maneuvers, I was surprised and then humored when Junior cried from the back of the fuselage: 'Keep 'er tail down, Daddy; keep 'er tail down.'"

New Machine Will Test Safety Belts



THE Bureau of Standards has just completed a series of novel tests in which a group of aviator's safety belts were stretched to complete failure. These destruction tests enabled scientists to determine the tensile strength of the belts in terms of pounds.

While the strength of the different belts varied somewhat—within the limits of about 700 to 1200 pounds—the Bureau of Standards draws the conclusion that the average aviator's safety belt can withstand a tug of approximately 1,000 pounds.

A new machine, imported from Switzerland, was employed by the Bureau of Standards in this series of belt breakage tests. It consists, in the main, of two elongated iron rods which are moved to and fro on a carriage. The test belt is placed in the jaws of this machine and as the two iron rods are lengthened there is increasing tension on the belt, until it ruptures. The tension required to insure failure is automatically registered in pounds.

The aviator's safety belt is of universal use by pilots and passengers riding in open airplanes and it is finding increasing service in cabin planes.

The first mishap experienced by C. Francis Jenkins, the noted inventor, in ten years of flying, was when he was piloting a cabin airplane without being strapped to the seat. Upon making a rough landing, he was thrown violently forward and suffered a gash on his forehead. On the other hand, the passenger riding with Mr. Jenkins was using a safety belt and he did not share the mishap.

This Plane Was Leading the Thompson Trophy Race

Some Notes on Capt. Page's Ill-Fated Curtiss-Hawk

THE Navy racer of Captain Page which crashed as it was leading the Thompson Trophy Race, was built five years ago as a standard Curtiss-Hawk pursuit plane. It originally carried a Curtiss D-12 engine and was flown to first place in the 1928 Curtiss Marine Trophy Race and, also, in the 1930 running of the same event.

Military circles were watching the performance of this plane closely, because, if an old ship with refinements can have its speed increased 75 miles an hour after five years of hard service, the pursuit planes now in service could all have their efficiency improved to a like extent by like refinement.

Many changes contributed to the speed of Captain Page's racing Hawk. In place of the Curtiss D-12 engine, a high compression, direct drive Curtiss Conqueror of 650 horsepower had been installed. The compression ratio had been raised until the engine would develop more than 800 horsepower.

To reduce frontal resistance, the radiator for the water cooling had been replaced by a pair of the famous Curtiss wing radiators, built around the wings. They were developed several years ago for racing planes and were used last year on the British plane that won the Schneider Cup.

When Captain Page's Hawk was brought to the Curtiss Aeroplane & Motor Company's experimental laboratory for rebuilding, the lower wings of the biplane were entirely removed, making the ship a monoplane. The upper wing was then internally braced and covered with laminated wood for added strength. Another change, to retain the safety factor of twelve, was to use a single strut from wing to fuselage. This was streamlined and enclosed the aileron controls.

Bowlus Builds Combination Glider-Sailplane

DEPARTMENT of Commerce approval has been given the Bowlus combination glider-sailplane. The plane is similar to the one in which Jack Barstow stayed up fifteen hours at San Diego recently, to win the unofficial world's endurance title.

Detachable wings and interchangeable center sections may convert this glider-sailplane into a primary or secondary glider or a sailplane. A landing gear may be attached for towing the plane when it is used as a glider.

By removing the wings and emplacing a two-foot center section instead of the regular fourteen-foot center section, the plane may be towed as a vehicle while beginner students learn to use elevators and rudder. The wings are attached, with a two-degree dihedral, to the short center section to convert the plane into a primary glider. In making it into a secondary glider the fourteen-foot center section is emplaced and the wings attached, giving the regular 60-foot wing spread of a Bowlus sailplane.

Famous last words—"Where is that darned ripcord?"

I Bum a Ride With a Stunt Pilot

Would you like to go for a ride with Freddie Lund, the famous stunt pilot? Charlie Graham went, while Lund let out his whole bag of tricks. The account of this breathtaking hop will make your head whirl!

By
CHARLES GRAHAM

THOUSANDS have seen Freddie Lund perform miraculous stunts in the air. Only recently the daily crowds at the National Air Races tensely watched him go through his thrilling routine from their seats in the grandstand.

But I am one of the privileged few who have not only watched him stunt from the ground, as an onlooker—but also as his passenger in the front cockpit.

It was a clear, brisk Fall day when Freddie took me up at the Kansas City airport. I had a lot of confidence in him since he is nationally known as chief test pilot for Waco and captain of the Waco stunting team.

Freddie Lund sat in the rear cockpit of his stunting plane warming the motor and scanning my face with a certain anticipatory interest. It was, perhaps, the look of the cat before it caught the canary.

Two men helped me into the harness of a parachute while a third poured detailed instructions of its uses into my ears.

I crawled into the forward cockpit, from which all controls had been removed.

The parachute instructor leaned over the side and pointed to two rings, one on each side of the seat, where the ends of the safety belt were anchored. The anchors were accorded a close scrutiny and a speculative tug or two before I buckled the belt across my lap.

"Grip those rings, and don't let go," the instructor yelled. The "don't let go" part proved wholly superfluous. I didn't dare!

We took off at a steep slant and watched the earth drop swiftly away. Lund turned and continued to climb until his altimeter pointed at 5,000 feet; then he circled over a curve in the Missouri River.

Off to the left the city water works lay like a trio of toy lakes with toy buildings beside them. The city stretched away endlessly southward, and on the right the airport appeared scarcely large enough to admit the wings of an airplane within its confines.

Lund waggled the wings, a signal that he was ready. I wanted to turn for a look at him, but a certain stiffness of the neck prevented. Instead, I seized the rings at the sides, looked at the buckle of the safety belt and nodded my head.

Suddenly, as if by the hands of a huge giant, I was flipped over and hanging head down, gripping the rings tenaciously and allowing most of my weight to rest against the safety belt. In the front of the cockpit my feet dropped against the edge of an apron which struck them over the instep, and my toe curled instinctively for a toe-hold.

The earth appeared ahead slanting steeply and it approached us with amazing speed. The wind tugged and tussled at my helmet and I gripped the rings in a sort of desperation while my mind went a bit inert.

I looked up. Unaccountably the earth had switched places with the sky! There it hung a mile above us with buildings and other objects sticking to it like large paper wads plastered on the ceiling of a school room. I watched it with fascination as we flew along, and shortly saw the city upside down drifting slowly rearward.

Quite unexpectedly the earth swooped down edgewise in a great circle and resumed its normal position down below. Lund had righted the ship and was returning to the field. Then as unexpectedly as before the earth shot up from the side and again stopped overhead.

Over the side of the cockpit were the clouds I had seen floating lazily overhead a few minutes before, now drifting with equal laziness down below, like aimless vagabonds.

Lund soon righted the ship and I saw the ribbon of muddy water writhing past the airport and the city as we again sought altitude.

Something more than a mile in the air this time the nose of the ship tipped forward and its motor bellowed its deep-toned roar as Lund opened the throttle. The earth appeared ahead slanting steeply and it approached us with amazing speed. The wind tugged and tussled at my helmet and I gripped the rings in a sort of desperation while my mind went a bit inert.

The earth sank swiftly from view and in its place the whitecapped clouds appeared racing over and down in front in a turmoil.

My body pressed heavily against the seat and it flashed upon me that this was the loop.

In another split second the pressure was relieved and I dropped against the safety belt while realizing that we

were at the top of the loop and going over. The earth whirled back across the vision, racing madly after terror-stricken whitecaps.

Loop after loop followed without cessation. Inertia of the mind gave way to photographic glimpses, impressions, flashes of ferocious speed and a wild, drunken tangle of earth and sky whirling like a great dervish. The heavy roar of the motor was followed by its idling sputter, to be followed in turn by the deep-timbred tone of cylinders spending power to pull the ship into the loop and let it fall again.

It reminded me of my rides in a roller-coaster.

ONE scarcely had time to untangle the blur of sky and planet as Lund leveled off until he tangled them again, sending them in dizzy cross circles about the long axis of the ship. The plane bored its way forward behind smoking cylinders while my body fell against the safety belt and back against the seat with rhythmic regularity.

It was the barrel roll, wing over wing, that from the ground looks like a huge whirligig and from the air turns the universe into bewildering convolutions of earth and sky.

Fingers ached with the intensity of their grip in the rings and the apron across the insteps left its mark as my toes curled tighter up behind it.

Lund leveled and climbed again. The earth now rested uneasily less than a thousand feet below, and I watched it narrowly as we climbed. I had learned that at its first eccentric quiver I should be prepared for whatever idiotic movement it might make. The rip cord ring resting on my chest became a soothing influence and all doubt of my ability to pull it, should the earth go completely out of control, left my mind. The problem now would be to refrain from pulling too quickly.

Such thoughts were not very complimentary to the pilot, but one does not think of compliments at such times. One speculates upon whether he will fall into the whitecaps or on the earth, and would almost wager on the whitecaps.

Lund circled at our ceiling and my fingers accepted the signal by a grab for the rings. The nose of the ship pitched forward straight down and sent the planet spinning like a top. There was a curiously eccentric motion to the spin, a bit off center as it were, and as it snapped around my body jerked against the safety belt with hurtling force.

It was the outside tail spin. I heard the shriek of the wind through wires and struts as we gathered speed behind an idling motor, and my body slipped forward until my feet rested against the end of the cockpit, to become rigidly braced.

The spinning stopped and we plunged. Lund pulled it level. The even motion was filled with deceit, for shortly the ship's nose lifted slightly, like an athlete gathering his muscles for a spring, and then flipped us over in a full turn.

I thought of a high diver I once saw perform that curious lifting jerk with his head and shoulders as he left a thirty-foot springboard to turn in the air before striking the water.

The river came to mind as a clammy afterthought.

My body rattled around in the cockpit like a ripe pea in a pod, despite a desperate grip in the rings. I do not yet see how Lund kept his position in his seat sufficiently to work the controls, for every curious jerk of the nose sent me sidewise against the fuselage, and every flip brought grateful acknowledgement of the usefulness of safety belts.

ANOTHER long climb followed while I looked out over the vast expanse of earth and sky for reassuring signs. There were none. We reached the peak again and Lund headed down in a steep nose dive. The ship leveled and went into a swift ascent, spinning rapidly. The vertical climbing roll, easiest of all upon the passenger, for the whitecaps ahead presented no obstacle and I lay easily upon my back and recovered my breath.

We reached the ceiling and fell, or slipped, over sidewise in a curiously easing motion. Lund nosed over and headed down again, to repeat the maneuver, and at its end he pulled the ship into another nose dive and set the world to spinning again as it rushed to meet us. It was the inside tail spin, and had none of the hurtling force of the outside spin.

He leveled *(Continued on Page 63)*

Twin-Engined Ship Proves Safe

PERHAPS the most striking demonstration of the safety of a two-motored ship was recently made at Milwaukee. On the day previous to the demonstration, several single-engined ships were tested. Pilots and mechanics at the field were frankly skeptical as to whether the Kingbird (a twin-engined ship) could better the performance of these planes and as to whether any multi-engined plane could maneuver satisfactorily with one engine cut out under full load.

Officials took their seats in the roomy cabin of the Kingbird while the test pilot sat beside the pilot of the ship. "You are going to be the one who cuts one of the engines," the pilot said by way of beginning the demonstration.

"When shall I cut it?" the co-pilot asked.

"Just as soon after our wheels leave the ground as you like," the pilot of the Kingbird replied.

Accordingly, while the six passengers in the ship leaned forward a little nervously in their seats, the co-pilot reached down and cut the right engine just after the wheels of the ship left the muddy flying field. The pilot had no foreknowledge of which engine was to be cut, making the test as much like a "bona fide" engine failure situation as possible. The Kingbird met the test by continuing to climb steadily on one engine and as soon as it gained sufficient altitude demonstrated its ability to maneuver with or against the single engine which was in operation.

Balloonist Plans to Travel Ten Miles Up

HERMETICALLY closed in the basket of a giant balloon, 97 feet in diameter, Professor Piccard, of Brussels, proposes to brave the terrors of the great cold ten miles above the earth, in order to study the mystery of the cosmic rays.

The problem of the air supply at this height is being solved by means of an apparatus similar to those used in submarines, by which the air is dosed with oxygen, and the carbonic acid gas is absorbed.

The temperature is calculated to be sixty degrees below zero, and the atmospheric pressure extremely low.

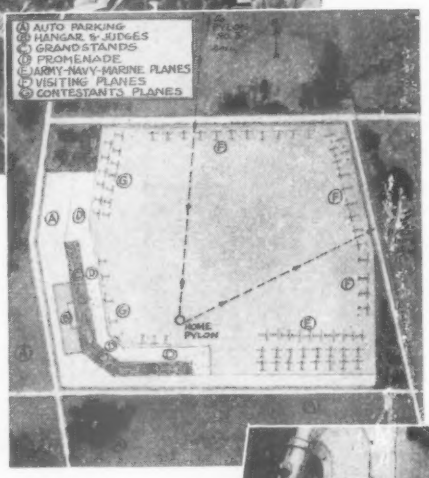
The cosmic rays are believed to be far stronger in the upper air, and apparently penetrate through the universe. According to one theory, they are given off by disintegrating atoms in space.

Professor Piccard believes also that air travel in the future may largely be at heights above 50,000 feet, where airplanes could go three times as fast, without extra energy.

Professor Piccard, who is seen looking through the cockpit of his unusual balloon basket, plans to make the ascension this Fall.

A DAY *at the*

Above, part of the day's crowd. A view taken from the south stands looking north with the hangar on the left and several contestants' planes directly in front.



Right, a memory map of Curtiss-Reynolds Airport showing the general layout of the scene of activities.

"Speed" Holman and the $10,000 gold Thompson Trophy which he won by pushing his tiny Laird around the course for 100 miles at an average speed of 201.91 m. p. h.

Below, Harold Pitcairn piloted one of the Pitcairn-Cierva Autogyros. The remarkable performance of the "flying windmill" made this one of the most talked-of exhibits.

Left, Lieut. Marcel Doret of France, the thrill artist of the day. He did all but fly the wings off his powerful Dewoitine Hispano pictured here with him.

Below, "Casey" Jones (at left) talks things over with Flight Lieut. Richard Atcherley of England in front of the latter's Blackburn "Lincock" Fighter.

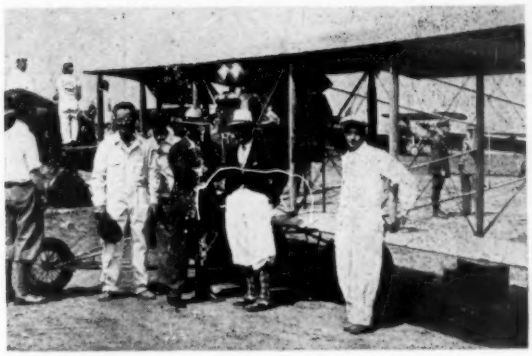
Below, "The little white one." Ben O. Howard's tiny home-made job was a consistent and popular winner.

AIR RACES

By

DAVID E. McMILLAN, JR.

Mr. McMillan attended the 1930 Air Races each day during the show as a special representative of POPULAR AVIATION. Let him conduct you through a typical day—



Jimmy Doolittle and Al Wilson (in knickers) with Al's 1913 type Curtiss pusher.

ALTHOUGH the 1930 National Air Races are now past, they will live long in the memory of those who witnessed any part of the ten days' events, and for the benefit of those who were unable to attend in person, we are now going to spend, in retrospect, a typical day at the races.

After a short drive from Chicago, we arrive at Curtiss-Reynolds Airport, a magnificent field of over 300 acres, transformed for the races to accommodate the needs of over 50,000 spectators daily. The huge hangar, now housing refreshment booths and exhibits, does not interest us at the moment as we are anxious to find seats before ten o'clock when the day's program starts.

We have a few minutes before the opening events so we look around the field to get our bearings. We are seated in front of the hangar in the southwest corner of the field facing due east. Just in front of us, about 300 yards into the field, is the home pylon, marking the start and finish of the closed course races.

Visible through the trees over to the northeast is pylon No. 2, a mile and a half away, while if we look almost due north, we will see the third pylon two miles from home and one and one-half miles from No. 2. These three pylons mark the five-mile course, which, while short, affords a full view of the contestants during the entire circuit.

Ed Heath rounds the home pylon in one of his prize winning parasols.

Our attention is brought back to the field by the excited chatter of a growing group of young men and boys who have gathered just beyond the fence in front of the grandstand. These are the entrants in the model plane contests, come from many parts of the country with the products of their summer's labor.

All types of models — tractors, pushers, twins, fuselage and scale models—rubber motors, spring motors, rocket motors, compressed air motors—tiny 10-inch models, giant 5-foot models —the air is filled with models and for an hour and a half the judges supervise these flights—checking, timing and rechecking all entries.

But look over across the field where the gliders are doing their stuff. The duration contest for primary types is on and we see a Rhon Ranger being towed into the air by an auto. In a few minutes they will start the spot landing contests and then we can see the Bowlus Sailplane and the Baker-McMillen Cadet perform.

Now that the morning's activities are well under way, just look around the rest of the field. There must be 400 or 500 planes parked around the borders. From here we can't identify many except the numerous Fords and Sikorskys. Of course, the army, navy and marine planes over in the southeast corner are easily recognizable and perhaps the announcer over the public address system will identify some of the others as they taxi out for takeoffs or come in for landings.

The stands are filling up quite rapidly; it must be getting on towards the time for the dead stick landing contests and the balloon bursting. These are the last scheduled events before the flag raising at one o'clock so unless you particularly want to see them, it would be a good idea to get some lunch now and stretch a bit as the afternoon will be a full one.

WE go down into the hangar and with a sandwich in one hand and a bottle of pop in the other look over the exhibits. Here in the center is a case containing the cups, trophies and prizes to be awarded the winners of the 49 race events. We try our hands at the controls of the Link trainers (see page 48, September issue) and pass on, anxious to get back to our seats.

At the grandstand gate we stand aside to let a group come through and we suddenly realize that the first man is Frank Hawks! That famous and ever present smile is positive identification, although Hawks is not as tall as we had imagined.

Then we watch the others and have no trouble in identifying Jimmy Doolittle, small in stature and name but big in achievement; Al Williams, tall and powerful looking; and "Speed" Holman with his mop of unruly black hair.

After taking our seats again we look about for some more celebrities and soon pick out Major "Shorty" Schroeder talking to Cliff Henderson. Just then the announcer introduced Roscoe Turner and his lion cub, Gilmore, and while Gilmore growls his greeting over the loud speakers, we spot Billy Brock, Elinor Smith, Igor Sikorsky and Clarence Chamberlin, all of whom we recognize readily.

The formal flag raising a few minutes later is followed by an exhibition flight of eighteen army pursuit planes whose maneuvers are being described by an army officer at the microphone. We marvel at the precision shown in the close formations, the intricacies of the squirrel-cage loop, the Lufbury circle and all the other complicated aerobatics. With a final power dive in formation, the squadron circles the field and lands in formation, leaving us somewhat breathless with the thrill of the roaring motors still in our ears.

Almost immediately seven planes take off for the first race of the day. We watch them jockeying for position as they round the course and hold our breath as the first three come up bunched for the turn at the home pylon. Around they go again, for this is a ten-lap race, and soon the leaders are lapping the tail-enders and the crowd gasps as the bunched racers narrowly miss disaster on the sharp turns. Soon the winner crosses the finish line and waiting for the others to finish.

While the last racers are landing, we are startled by a rush and a roar that zooms up and does a few stunts while

shakes the ground, and out of the sky behind us comes a streak of orange and red greased lightning. It is Jimmy Doolittle in his Travelair Mystery Ship who is scheduled for 20 minutes of aerobatics. Before the 20 minutes is up, our necks are stiff from following the gyrations of his plane in power dives, climbing rolls, slow and snap rolls, whip stalls, spins, wingovers, loops and inverted flight.

We are somewhat relieved to find that the next event is another race, which, after Doolittle's daring exhibition, is relatively easy on the neck and nerves.

During the race, several mechanics wheel an antiquated-looking old bus out on the line and start warming up the engine. This is Al Wilson's old 1913 type Curtiss pusher and there's Al himself looking very neat in his golf togs and smoking a cigar almost as big as he is.

After the photographers have taken numerous pictures of Al perched out in front of this old box-kite, he takes off and gives us a sample of 1913 model aerobatics, consisting mainly of dives, zooms and wingovers.

NOW, all eyes are on three planes lined up just in front of the stands. They are the foreign flyers' planes and would have been four except that Capt. Loose washed out his Junkers Junior on the opening day.

The red and silver biplane on the left is a Breda brought over from Italy by Marshal Pietro Columbo. And there's the Englishman, Flight Lieut. Richard Atcherley, standing next to his little black and red Blackburn "Lincock" fighter, powered with an Armstrong-Siddeley, 250 h. p. "Lynx."

But Lieut. Marcel Doret, the Frenchman, has the snappiest looking outfit. Doret is that stocky fellow in the chamois flying suit. His plane is a Dewoitine tapered wing parasol monoplane with a 500 h. p. Hispano and has a top speed of 192 m. p. h.

First Atcherley takes off and spends most of his time on his back, as he is a master of inverted flight. Then Columbo, not to be outdone, does a series of outside loops—a remarkable performance for the plane he is flying. Doret's plane is not equipped for inverted flight so he contents himself with a beautiful exhibition of ordinary aerobatics generously interspersed with terrifiyng power dives.

Just as Doret lands we notice a Curtiss Fledgling training plane going through some mighty queer antics. It takes off in a zoom, stalls about 50 feet from the ground, slips off on one wing, partially recovers, but comes down on the landing gear and then bounces 20 feet in the air.

Coming to the pylon, it starts a turn but banks in the wrong direction and goes into a violent outward skid, crabbing along sideways until the outer wing tip settles on the ground and in this position it rounds the pylon, the wing tip leaving a trail of dust behind.

The announcer finally explains that this is Dick Atcherley giving an exhibition of what he calls "crazy flying"—everything a good pilot should not do. After watching him round the field with the tail skid dragging and the wheels two feet off the ground, we agree that it may be crazy flying, but it is also one of the best exhibitions of skill ever put on.

Results of the 1930 THOMPSON TROPHY RACE International Free-for-All
100 miles—20 laps (5-mile course)

Pilot	Entrant	Plane	Motor	Time	Speed	Money	Place
Chas. Holman	B. F. Goodrich Co.	Laird	P & W	29:43.0	201.91	$5000.00	1
Jas. Haizlip	Shell Petroleum Co.	Travelair Mystery S.	Wright	30:01.8	199.80	3000.00	2
Ben O. Howard	Ben O. Howard	Howard	Gypsy	36:51.3	162.80	2000.00	3
Paul T. Adams	Thos. Griffin	Travelair Biplane	Wright	42:03.8	142.64		4
Errett Williams	Wedell-Wms. Air Ser.	Wedell-Wms. Spec.	Wright			(Landed at 8th lap)	
Arthur H. Page	Arthur H. Page	Curtiss-Hawk	Curtiss			(Crashed 17th lap)	
Frank Hawks	Texas Company	Travelair Mystery S.	Wright			(Landed 4th lap)	

"Here come the Autogyros," the announcer calls as we see approaching in the distance three queer looking planes. On consulting our program we find that the next half hour is given over to exhibitions by the Autogyros, the McDonnell "Doodlebug," and the Waterman variable wing plane, all "safety craft" designed to land slowly, take off quickly, and maneuver safely.

J. S. McDonnell, Jr., has a low wing open monoplane equipped with slots and flaps and a special wide-tread landing gear, and he certainly puts on a nice performance in his "private airport," a 150-foot circle of flags. He comes in abruptly for a landing and stops within 40 feet and then is off again after a run of about 125 feet.

The Autogyros with their queer revolving "windmills" circle the field slowly, almost motionless it seems, and coming in almost vertically, land with only a ten-foot run. The crowd, not used to this unusual performance, applauds generously as the three Autogyros take off and then pass the stands at their top speed of over 100 m. p. h.

In the meantime, Waldo Waterman is streaking around the field in his green and orange low wing cabin job. His plane has a normal takeoff and landing speed, but by increasing the dihedral of the wing while in flight, he is able to boost his top speed to 137½ m. p. h. while retaining a relatively low landing speed.

Altogether we agree that this is one of the most interesting exhibitions of the day as it gives us an insight into what we may expect of planes in the near future.

AND now we look up and see two tiny red specks about 3000 feet above our heads. "Duke" Jernigan is towing Frank Hawks in the "Eaglet," his custom-built Franklin Sailplane—the same men and planes that made the transcontinental flight a few months ago.

While they are gaining altitude, a number of parachute jumpers in front of the stands are preparing to take off for the last scheduled event of the afternoon's program. A few minutes later we are somewhat startled to find Capt. Hawks just a few hundred feet over our heads. All afternoon we have had the quick thunder of exhausts in our ears and we are somewhat awed by the slow majestic movements of this silent bird as it floats gracefully on the breeze. The crowd seems to catch the same feeling of calm and restfulness that we have and gives Hawks an enthusiastic reception as he lands.

Cries of "There's one!" cause us to look up quickly and sure enough, a tiny speck comes tumbling out of that big Fokker over our heads and in a second a puff of white unfolds and the first jumper is on the way down. Half a dozen more soon join the first man and the crowd begins to speculate on how close they will come to landing in the circle in the center of the field.

There must be a good wind up there, it looks as if the first man will overshoot the mark—but watch him! He's slipping his chute. He's grabbed the shroud lines and collapsed his chute to less than half normal size and is coming down at a tremendous rate. We hold our breath until he again releases his chute and floats down to a safe landing just inside the circle.

As the last of the jumpers lands, the field is opened for passenger flights and we get up to stretch and decide what to do for the next two hours until the evening show starts. For a few dollars we can take a flight in either the 6-place Travelairs, the Fords or the giant Curtiss Condor, but we decide to circle the borders of the field and examine the many planes parked there.

On our way out to the apron, we chat for a minute with Ed Heath and recognize several other well-known flyers —"Casey" Jones, Matty Laird, Freddie Lund, John Livingston, Art Goebel, and Amelia Earhart.

And then the planes! You could write a book about the interesting planes that stretch out on all sides. Here's that diminutive Laird Speedwing Special with the "suped up" Wasp that won the Thompson Trophy—Benny Howard's little white flash—and here's the smallest plane of all, the black and gold Pobjoy Phantom, only twelve feet long. That shiny all-metal job that looks so much like a Lockheed Vega is the new Northrup. This green and orange giant with the crowd around is the 22-passenger Burnelli with two 800 h. p. Packard twelves. It's almost a flying wing with its airfoil section cabin fourteen feet wide and the tail surfaces are on outriggers.

But if we want to get around the field before dark we'd better hurry on so we pass rapidly through the military rows of service planes, Keystone bombers, Boeing and Curtiss pursuit jobs, Douglas *(Continued on Page 52)*

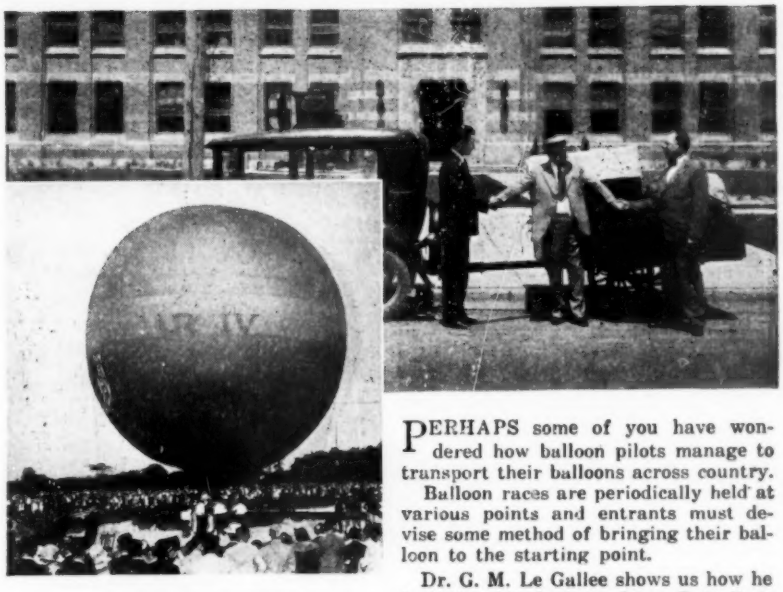
New Plane Has Only One Control

AFTER twenty-five years of experimental work, E. M. Burchell of San Jose, California, has invented an airplane that carries out the principles of a flying eagle. The idea is believed by several aeronautical engineers on the Pacific Coast to be a practical invention from an engineering standpoint.

The new plane, to be known as the Burchell Type, is a high-wing monoplane with two motors. The top wing is separated into three segments, each of which can move either independently or as a unit. The proposed ship is constructed without any verticle rudder or ailerons. The wings are not full cantilever type, but are supported from underneath by a large strut which also serves as a control in raising, lowering or turning the wings. The construction includes four wing surfaces, a large side wing on both sides of the fuselage, a long center wing extending along back of the fuselage and a fan-shaped tail wing situated horizontally in normal flying as do the other wings.

The plane is operated by a single control, said to be on the order of a joy-stick without the left and right motion. This device moves forward and back, and controls the lift of the three wing surfaces and the tail. On the stick is found a rotating wheel controlling the verticle turn of the tail surface, and the raising and the lowering of the left and right wings. The plane has no foot controls. According to Mr. Burchell, the plane absolutely will not tailspin, and is capable of attaining a higher degree of efficiency with greater responsive control, owing to its principles of construction following features of a bird.

How Big Is a Collapsed Balloon?



PERHAPS some of you have wondered how balloon pilots manage to transport their balloons across country.

Balloon races are periodically held at various points and entrants must devise some method of bringing their balloon to the starting point.

Dr. G. M. Le Gallee shows us how he brought his balloon from Detroit to Houston. Dr. Le Gallee piloted the "Kelvinator" balloon in the National Balloon Race.

The balloon is compressed into a small compact bundle and carried on an auto-trailer. The basket is also carried on the trailer and is filled with the various instruments and equipment necessary for the race.

The contrast can be gained from the inset which shows one of the balloons, fully inflated, awaiting the start.

New Instrument Measures Height of Clouds

A NOVEL instrument for measuring the height of clouds at night has been developed by Charles F. Marvin, chief of the U. S. Weather Bureau. It is a clinometer and is intended to determine the ceiling of low-hanging clouds for the benefit of aviators. This information is vital to the safety of air navigation, since airplane pilots can frequently avoid fog or other obscure conditions of flight if the height of the clouds is known.

During daylight the ceiling height may be estimated by noting the appearance of the clouds and observing the known height characteristics of different types; or toy balloons may be released to the upper air to aid in computing the altitude. Existing methods of cloud-height measurements at night, however, are uncertain. The so-called "alidade," as employed at some of the civilian airports, is a relatively cumbersome instrument and the ceiling light as now constituted is subject to certain limitations.

Weighing about one pound and sufficiently compact to be carried in one's hand or overcoat pocket, Mr. Marvin's clinometer or so-called clinograph has a sighting tube three inches in diameter, with two cross-wires at the open end. Attached thereto is a small metal plate graduated in both angular degrees and feet. Moving over this graduated scale is a tiny pendulum, swinging freely. The instrument is used at night and, of course, is employed in conjunction with a searchlight of 250 to 500 candlepower, to illuminate the lower surface of the cloud. It is this spot of light on the ceiling upon which the observer trains the clinometer.

The searchlight used with this instrument should be installed at the airport at a predetermined distance from the point from which the observation is to be made. The observer trains the clinometer on the cloud-illuminated spot, and while in this pointed attitude—with the pendulum hanging freely— a slight turn of one's finger clamps the pendulum in a fixed position, and from the reading on the scale thus obtained the height of the clouds is calculated.

Heath Wins Race

AT the National Air Races, Mr. Heath flying his Heath Parasol won first place in the lightplane race with an average of 79.13 miles per hour. Second place was won by a home-built plane made by Walter R. Franklin. It was originally constructed as a Heath Parasol but was converted into a Church Mid-Wing. Third place was also won by a Church Mid-Wing.

To those that have followed this class of lightplane racing this year's event was quite a success.

The Dayton Race (1924) for 80 cu. in. planes was almost humorous. This lightplane event was called at 10 a. m. and the entires were given until 5 p. m. to finish. When the race was started it was a minute and a half before any of the planes got into the air, and at that, only five of the seven that had been on the line managed to take off. The race had hardly started when one after another were all forced down.

Fifteen minutes later one plane managed to start again. At 2 p. m. a second one managed to take off again. Only these two finished the race.

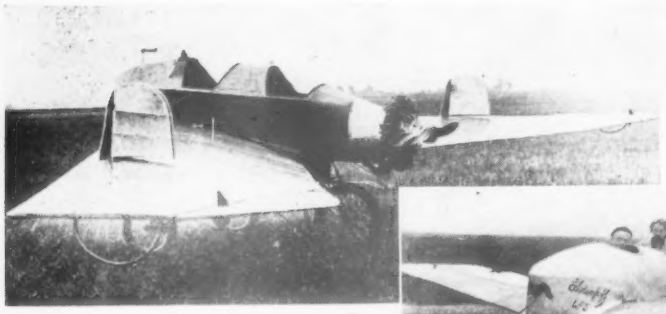
Quite a contrast can be made with the 1930 race. Six lightplanes were on the line at the crack of the gun—and six planes finished.

Swiss Flyer Invents Queer Plane

A VIEW of the new tailless self-stabilized plane, an invention of the Swiss designer Soldenhoff. This ship reached a speed of 111 miles an hour, during test flights.

Inventor Soldenhoff spent two weeks in trial flights with his "fool-proof" plane at Dusseldorf, Germany. Unfortunately during one of the tests, Soldenhoff crashed and was severely injured.

In the accompanying pictures, Soldenhoff is shown in his queer looking craft.



227 Miles Is World Record Photograph

"HOW far can an object be photographed?" A tentative answer is found in the recent achievement of the Air Corps of the United States Army in obtaining an aerial photograph of Mt. Ranier over a stretch of 227 miles.

Analagous to the illustration of a hunter invading a forest, closing his eyes and discharging a gun with the hopes of killing game, the aerial photographer of the Air Corps was compelled to focus his camera blindly. Pointing the lens in the direction of Mt. Ranier, several successive attempts resulted in a photograph from an altitude of 17,000 feet and a distance of 227 miles from the objective. This accomplishment is said to be a world record for long-distance photography, bettering previous records by more than 50 miles.

Prisoner Perfects Stabilizing Device

A SHORT while ago we read about a prisoner of Joliet, Ill., penitentiary who was supposed to have invented a remarkably efficient propeller. Upon investigation we found out that there wasn't much to the story.

However, we now have another prisoner with inventive faculties. Harry Knowlton, an inmate of Michigan State Prison, Jackson, Mich., has perfected an ingenious stabilizing device.

Tests of his device were made at the prison with an improvised wind tunnel, using a model airplane wing for the demonstration. When tipped to either side in the test, the wing was immediately righted by the stabilizer and was held perfectly level, even when a weight was placed on the tip of one wing. The demonstration was to show how the device would direct the flight of an airplane without the guidance of a human pilot.

The contrivance is very compact, weighing not more than ten pounds when completely installed in a plane, its inventor claims. Its operation depends upon compressed air which automatically regulates, through application of pressure in four small cylinders, two of which are shown in the illustrations, the ailerons and elevators. The piston rods of these two cylinders are joined in the center of the device to a connection with the aileron control wires which run through the wing.

For the purpose of developing and demonstrating his invention, Knowlton constructed the four-foot wing shown in the accompanying photographs, but in applying his device to the wing he did not follow the scale model. Instead, he built his device to the actual size that will be used on standard airplanes. A part of his invention, that which regulates the lateral flight of the plane in the same way that the illustrated mechanism controls the wing, was not included in the pictures, being merely another application of the same principle portrayed on the model wing.

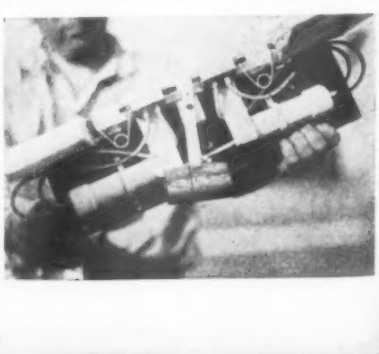
The key to the whole device is a button on top of the pilot's control stick in the cockpit. When he assumes charge of the ship's flight, the pilot rests his thumb on this button and while holding it there the plane will operate normally.

In the event that he loses consciousness or for any other reason releases control of the stick, however, the stabilizing mechanism instantly takes charge of the situation and holds the plane in level flight until the motive power is exhausted, after which the ship will be brought to the ground in a glide governed by the device.

While the action depends on the button on the control stick, the real "brains" of the invention is the pendulum which is seen in one of the illustrations. Although not so shown in the picture, this is suspended from a universal joint and moves freely in all directions in accordance with the pull of gravity as the plane changes position.

When the button is released, a valve in the control stick is opened and the compressed air instantly acts on one or the other of the two sliding valves shown at the top of the device, depending on whether or not the position of the pendulum indicates that the craft is out of balance.

If the wing is slanting to the left, as one of the photographs shows, the pendulum opens the valve on the right, allowing the air pressure to act on the right piston. This force is transferred conversely to the aileron controls which simultaneously react as shown by the position of the ailerons in the picture. As the wing swings back to a level rest, the air pressure on the right piston will diminish while counteracting pressure will be applied on the left cylinder, producing a steadying effect.



Left, the inventor is shown with his model plane to which is attached the full-size stabilizing device. Right, when the wing slants to the left, the pendulum opens a valve which indirectly adjusts the aileron controls.

Crashing Planes for the Movies

"The solution is not in armor . . . but in the knowledge beforehand what will splinter . . . and where those splinters will go." A famous daredevil thus explains his successful crashes at terrific speeds

The second and concluding article.

By
DICK GRACE

I AM safe in saying that I receive less thrill than anyone of those who watch me. I am the only one who does not hear anything. The explosive noises make no impression on my auditory nerves. I see little dust, and get no sensation other than that of satisfaction or disappointment that the ship is or is not doing as I wish.

Spectators see the plane come in from afar. They hear the fateful drone of the motor. Their desire to talk aloud is supressed by stern orders of the police, who demand absolute quiet. Nothing but crash sounds must record on the film.

Gradually the ship gets larger before them. They see a slight object flutter from the ship—the pilot's goggles. Then the cameras start to grind—the sound trucks hum their monotonous song of operation.

Seconds seem to lag as the plane speeds along.

Then it seems to shoot suddenly forward. The nose is raised, the right wing drops, the tail goes into the air. With a vicious roar—a splitting, splattering sound, the prop breaks; the motor digs in, the wing tears off.

Perhaps the ship hits so hard that it bounces. It twists over on its back. Directly below the pilot's head a heap of broken struts and steel tubes gather. The spinning wheels fly into the air, the linen of the fuselage is ripped—all four wings are torn off.

With a last quiver the plane settles slowly back—not a rib, not a control useful.

That is what happened on one of the crashes in "Young Eagles." I ended upside down without wings at a distance of not more than five feet from the nearest camera-man—and just as close to a microphone.

After the cameras stopped the rescue crew helped me from my inverted position. They found my shoe, which had been torn from my foot by sheer force, among a pile of debris.

Spectators and friends usually fear for the outcome of these intentional crashes. Many of my best pilot friends will not witness them. Even the casual observer is somewhat awed and impressed.

I DO not say I will never lose a ship. Sometimes that is necessary. Nor do I say I will never be injured—for I have been. But good judgment and a cool head, combined with knowledge, certainly gives any pilot an advantage.

I don't like to crash and I don't dislike to. It is a matter of profession with me. There is no thrill, no sensation, nothing to be proud of in my line of work. But there is the satisfaction of doing a job as specified and doing it in a scientific way.

I am not always going to crash. Someday I will go back to commercial aviation. Then this knowledge and the experiences which I have encountered in performing these duties will be invaluable.

Flying is a responsibility to every serious minded pilot. So is crashing to me. Were I to take my washouts lightly I'd probably make a little mistake—and there is no eraser on the pencil of said aviator.

IN "Wings," crashing into a shell-pitted no-man's land in a little French Spad gave me some difficult problems.

A washout with this type of ship at any time is serious. In the first place it is so small that it is impossible to get the head below the cowling. No one likes to balance an inverted ship by the muscles of the neck or by the spinal cord.

Again, with wooden longerons, there is danger of splinters and broken sections piercing the back. So these members were taped from the motor mount to the tail. The cockpit was strengthened with light shelby tubing. Special gas tanks were built to replace the pressure system used in this type of ship and the inter bay struts were weakened on the right to allow that wing, which was to hit first, a proper opportunity to fold.

When and where I hit, and my escape without a scratch, probably always will be a thing unbelievable to many of those who saw it. Suffice to say that I tore out a section of barbed wire entanglements for about seventy-five feet—and when I say I tore them out I mean it.

The cedar posts, to which the wire was wrapped, were imbedded two feet in the ground and protruded four. Thirteen of them were completely torn out. On the last roll which the ship made I ducked forward so that I would not be pinned to the ground. Just at that moment a post pierced the cockpit eleven inches back of my head, ripping part of my flying coat away.

I use no personal protection other than a padded helmet. Once a piece of propeller passed between the side of my coat and my controlling hand with sufficient force to pierce a one-eighth-inch steel plate and a steel longeron. How much armor would be needed to give protection to the body—even for such a small splinter?

The solution is not in armor of the body—but in knowledge beforehand of what will splinter and where those splinters will go.

A complete washout, perfectly completed by Dick Grace for a Paramount Picture. Note the perilous but safe final resting position of the cockpit.

Belts are of the utmost importance. In addition to the regular lap belt I install a set of wide webs across my chest, which are adjusted so tightly before the last takeoff, that it is impossible for me to take a full breath.

I WEAR the flyer's regular clothing. A helmet, goggles, Bedford cord trousers, oxfords and woolen socks. The reason for the latter in place of boots

is that in case of leg injury boots are harder to remove.

Personal precautions are few. Instead of ducking I must watch the ground speeding under me. I have to see the spot approaching. Sometimes I am forced to side-slip and at others skid and fish-tail so that this is possible.

Until I hit, my head must be out on the side of the ship which first crashes. My unprotected eyes are subjected to the full propeller blast, but I know from the several times my head has been dashed into the pit or instrument board that my eyes would have been destroyed had I used goggles. Moreover any sort of optical protection creates a certain amount of distortion and also limits the angle of sight.

I must hit an absolute spot, with an excess of speed, and with regard to cameras, microphones, men. The ships are usually stock jobs, rebuilt to suit the needs of the picture. With the exception of removing the instruments from the board (and padding that member) the cockpit is practically the same as that of any ship you might fly. Sometimes I wrap the steel tubes near my feet.

I have rescue, fire and police crews but never have I had to use the former two, and the latter but seldom.

The physical conditions I enforce upon myself are extremely important. As I have mentioned, diet before is necessary—for a crash on a lean stomach allows much more compression of interior parts—thereby doing away to a great extent with danger of rupture. If I was injured an operation on an empty stomach has much more chance of being a success.

WATCH your crashes in the movies. Nine times out of ten you'll find some part of the right side of the ship go in first—the reason being the shock will be transferred to the right side of my body. Remember that the heart is on the left. Sometimes the shock I receive is a terrific one—and shock has been known to stop the heart. Moreover the stomach is not in the center but inclined to the left.

Time of day makes a difference. Eleven forty-five a. m. was chosen after Harry Reynolds, my ground engineer, and I decided that a combination of best conditions prevailed then. The wind was usually steady, the light good, my physical condition the best.

Each of my crashes is a problem, demanding separate solution. I firmly believe in dissipation of forces. I may hit at ninety to a hundred per, but first a lower panel goes, then struts and the upper panel. By this time I have considerably lowered my speed and force.

The undercarriage splinters, the prop breaks and the motor hits. If the ship rolls over on the other wing it's a lucky break for me.

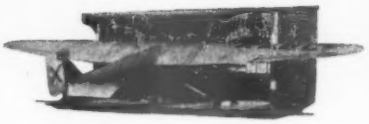
Finally when the force is transferred to the cockpit and to me I'm probably taking but forty to fifty miles an hour shock—and the scene is the more spectacular for it.

Though my work is separate and without any connection to commercial aviation, and will soon pass into oblivion, I feel that I have accomplished my purpose. I've proved that crashing a ship doesn't necessarily mean serious consequences. Thirty-four ships would make quite a line on any field and from my present plans I must do at least three more.

Time and again I've been asked the same question—'What are the most important factors to be considered in crashing an airplane?"

The most imoprtant thing that anyone has to do in any adverse circumstance is to keep his head. Not just to keep it—but keep it working!

Good judgment and a cool head, coupled with instantaneous decision, will usually pull anyone out of a tight place—whether it's hit or whether it's miss.



Efficient Nose Hangar

AN interesting type of nose hangar unit to house Ford tri-motor planes, operating on Central American routes, has been developed by engineers of Pan American Airways. The photograph shows a typical unit of this type.

The "nose" hangar saves the expense of a full-size hangar. It protects the planes in heavy rains, giving the mechanics shelter for any necessary work on the engines during servicing stops.

This particular type of hangar is said by the engineers to be particularly adapted to operations where Ford tri-motor planes are concerned, since these planes stand up so well in the open.

THE AIR TRAIN—WITH TRAILERS

This Month's Cover Forecasts What Aerial Travel May Be Like in the Future

THE great tri-motored ship slows up and gradually comes to rest at the air field. Six gliders towed behind sink softly down and stop, like so many great birds. Men hurry back and forth, unloading the express and mail, while some passengers stop off here, others step into the towing ship to take their places.

All ready once more, motors hum, the plane takes off gradually, the gliders with their pilots following, and soon the aerial express train is but a receding sound.

Such will be the scene at many airports in the future. And, with aviation's progress, it is not so far distant. The flight of Captain Hawks across-country in a glider towed by an airplane may be a forerunner to the "air-train."

Lindbergh, when he was spending so much time "fooling" with gliders, seemed to be merely having a good time. But wasn't he experimenting to see how practical they would prove, what kind of loads they would carry? That young man always has an object in view when he is working!

And as a result of Captain Hawks' successful trip and of Colonel Lindbergh's experiments may we not look for some such an express service? Little did we think when the Graf Zeppelin came here on its initial trip that it was the forerunner of a trans-Atlantic Zeppelin service, such as is now being inaugurated.

That gliders will carry loads has been proven. Fokker, some years back, entered a factory-built glider in the German glider trials, and was the first ever to fly with a passenger. Now the record, held by a German, Ferdinand Schulz, for time in the air with a passenger, is nearly nine hours and a half!

Experiments are constantly being made as to how to increase the "pay load" per horse power. Flying Wings have been one result, where passengers' baggage, express and mail are stored in each of the two metal wings.

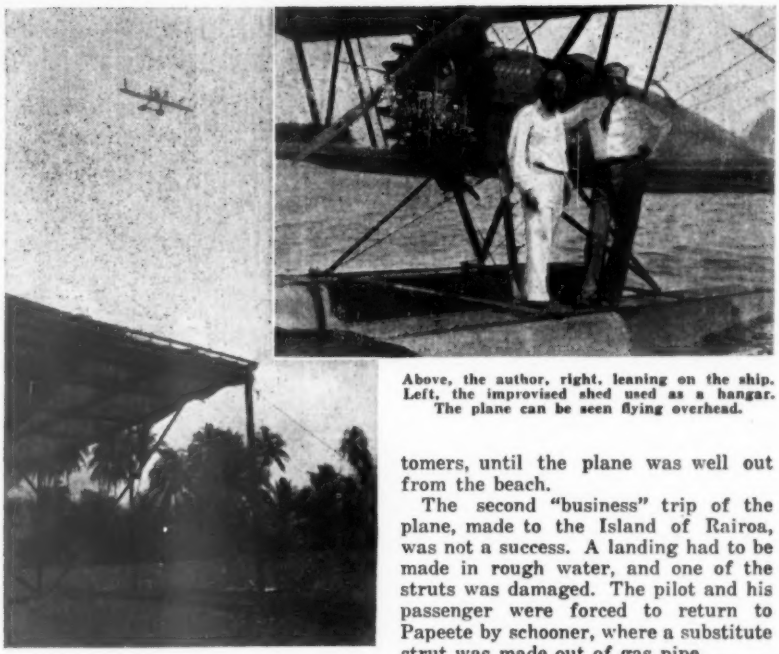
But the aerial train will prove a real solution. For, according to the load, gliders may be added or taken off, just as is done on the railroad trains today. Instead of fleets of planes taking off, each with their separate load, costing the maximum to transport, these loads will be placed in gliders, towed behind the multi-motored plane, and at a minimum of expense—bringing down the cost of transportation by air, yet increasing the profits of the operators, and giving occupation to more young men, experienced glider pilots, for each towed glider will have its pilot, a young man trained thoroughly, licensed by the government, able to fly the glider by air currents, land it safely, in case it should for any reason become separated from the motored ship.

So look ahead, and without too much surprise, to the coming day of the "Aerial Express Train!"

Pilot Salaries

AIR mail and passenger pilots are now receiving an average monthly salary of $550. Airplane and engine mechanics receive an average monthly salary of $157.

The pilots receive an average monthly base pay of $189 but this is increased to an average total monthly salary of $550 by the addition of certain sums paid by operators for each mile flown, which varies with conditions under which the flying is conducted and depends upon day or night schedules. The additional amounts average five cents a mile for day flying and ten cents for night flying.



Above, the author, right, leaning on the ship. Left, the improvised shed used as a hangar. The plane can be seen flying overhead.

Waco Provides Thrills for Natives

By D. S. Jeppson

TAHITI, the home of dollar champagne and twenty-cent beer, was recently treated to all the ordinary thrills of aviation.

A local coconut oil company imported a brand-new Waco, powered with a Whirlwind motor, for the purpose of fast transportation between the islands.

Setting up the plane provided entertainment for the natives for several days. A great many admitted the thing could probably get off the ground, but most of them felt it had no business remaining aloft.

The day the plane made its first flight was a red-letter day in Papeete. The beach was thronged with spectators to see this strange American contraption leave the ground. When the big motor started with a roar, however, the show lost most of its cash customers, until the plane was well out from the beach.

The second "business" trip of the plane, made to the Island of Rairoa, was not a success. A landing had to be made in rough water, and one of the struts was damaged. The pilot and his passenger were forced to return to Papeete by schooner, where a substitute strut was made out of gas pipe.

When the plane was again brought to Papeete, it was kept busy making short flights around the Island. A shed was constructed of coconut palms, with a make-shift runway leading to the water. A float with rollers was also made, and when the day's flights were finished, this float was submerged and placed under the pontoons. A block and tackle was then hitched to the float, and with the help of some of the natives, usually hanging around watching operations, the plane and float were pulled to the runway and rolled into the shed. Had the Island been visited with a real South Pacific blow, plane, shed and coconut palms would all have been scattered over the lagoon. Fortunately the weather was fine, and left the real thrills to be engineered by ourselves.

As passenger boats arrive at Papeete but once a month, the pilot arranged to meet the next incoming steamer some hundred and fifty miles out.

I have since wondered what the reactions of those on board were, when they approached their journey's end, thinking to have left civilization behind for the glamour of a primitive South Sea Island—and were met before they reached port by an ordinary American-made airplane.

On the return, the pilot flew at ten and twelve thousand feet. In losing altitude for a landing, the motor cooled considerably, which probably saved it from becoming a total loss after the next few minutes.

The plane circled over the lagoon and touched the water at a fast pace. As the pontoons settled, the plane turned at a ninety degree angle and went over on her nose. The watching natives along the shore accepted the accident as the inevitable.

A scow was manned and sent out to pick up the two men. The plane was settling rapidly, going over in a slow somersalt. Watching, we saw first one and then the other of the two men crawl out of their pits and hang on, shifting their positions to meet the slow turning of their precarious foothold. It did not take long to get help to them, and they were brought ashore, a little shaken, but otherwise not much worse for the experience.

In a few *(Continued on Page 64)*

Seaplane Will Fly Atlantic With Pay Load

THE flight of the "Trade Wind" from New York to Paris and return, by way of Bermuda and the Azores, will be the first attempt at a trans-Atlantic flight with a heavier-than-air machine carrying a pay load.

Previously, Colonel Lindbergh and those who emulated his feat have demonstrated that the Atlantic can be flown. But the airplane in its present stage of development requires so much fuel for a non-stop flight that it would be neither safe nor practicable to add to its burden any considerable amount of other cargo on such a flight.

The "Trade Wind" will have two pilot-navigators. It will be equipped with pontoons for landing at sea, with the latest instruments for navigation under all weather conditions, with a powerful sending and receiving radio, and with all the other modern equipment for safe long-distance flying.

More important, the "Trade Wind" will span the Atlantic in three comparatively short hops, with refuel landings between. This greatly increases the margin of safety, permits a big reduction in fuel load, and leaves the "Trade Wind" with considerable surplus capacity which will be utilized for pay cargo.

The trans-Atlantic ship, a six-passenger Bellanca seaplane, will probably make the trip in October.

Radical Motor Glider

THE new Arrowhead safety plane, a motor glider, radically differs in design from any type of aircraft now known to be on the market. This strange ship is tailless and its wings run back from the fuselage at a 45-degree angle. The plane has the appearance, from the top, of a huge "V."

The Arrowhead was developed by James Davis, designer, who developed the Burgess plane which first made its appearance during World War days. This plane was not popular at the time because it lacked the ability to maneuver that was sought in military planes.

The late Glenn H. Curtiss, aviation pioneer, coöperated in building the

The Arrowhead Safety plane does not look much like a power glider because of its radical design. It is built in the shape of a "V" and is powered with a 30 h. p. engine.

craft. Only the lack of a propeller prevented test flights being made before the untimely death of Mr. Curtiss, who was one of its chief sponsors.

The plane carries a 30-horsepower Szekely motor, a four-gallon gasoline tank, and is propelled from the rear. It is mounted on three wheels, one under the center of each wing and one under the fuselage in front.

XUM

Why Forced Landings Are Infrequent

THE day of forced landings is just about gone. If you will set your mind back to the first forced landing you heard of, you will find it dates back several years and the ship was the single-motored type of a rare old vintage and it is quite likely the motor was one of those water-cooled motors with only single ignition (or one magneto). Forced landings were frequent with that equipment. The reason was, if the motor had eight cylinders it had only one set of eight spark plugs and one magneto, consequently, if two or three plugs went bad the pilot had to effect a forced landing because of lack of power. Those ships were underpowered even with all cylinders working so if a magneto went bad, being the only magneto, the result was another forced landing—motor would often heat due to leaks in radiator, hose connections, poor cooling system and many other causes resulting in forced landings.

Take the up-to-date air-cooled airplane motor, two magnetos, two complete sets of spark plugs, several of which can go bad and still the motor will develop sufficient horsepower to carry the plane and load; likewise, either of the magnetos can go out of commission and you still have the same safety factor as you originally had in the old single ignition motor, consequently, your forced landing hazard is greatly decreased even in the single-motored plane.

Now, we will look at the tri-motored planes. Three motors of equal horsepower are an advantage over three motors of unequal horsepower. The planes of unequal horsepower have a motor of much greater horsepower in the nose and smaller horsepower in the wings. Should one wing-motor cease to function there is no immediate need to worry or make a forced landing as the nose-motor alone will, in all probability, carry the load but, if the nose-motor goes out it is time to look around for an emergency landing field as the two motors of small horsepower will usually just about fly the ship level. Therefore, the big demand for tri-motored planes of equal horsepower.

Now, about our gas supply. A transport plane carrying six hours gas supply or over has a decided advantage over the ship of lesser gas supply as it enables the pilot to fly a considerable distance on his route and yet return to a safe landing field should he encounter such weather conditions that he could go no further with safety.

These late type airplanes are all equipped with several hundred miles gas supply as compared to the 150 to 200 miles of the old obsolete type ship that used to make so many forced landings. This gas supply is not carried in any one tank, it is carried in two or more, so should one tank spring a leak there is yet several hours gas in the other tanks, consequently no forced landings due to broken gas tanks. There are also separate pipe lines leading from each tank which in turn have a separate shut-off or valve so should a gas line break it can be shut off with very little loss of gas. Again each motor in turn has its separate gas line and can be shut off at the pilot's will should it be necessary.

These up-to-date ships are also equipped with fire extinguishers so should they by any chance catch fire, either in the air or on the ground, the pilot can flood either one or all three motors with pyrene, merely by turning a little thumb screw. It can readily be seen that the day of forced landings is about over—only through some exceptional cause can it happen.

Bellanca Ship Has Unusual Design

THE Bellanca "Airbus," a single-motored airplane, is designed for combined mail and passenger work.

It has a high speed of 147 miles per hour and cruises at 125 miles per hour at 2/3 full power.

The design of the "Airbus" concentrates the load near the center of gravity so that the stability of the ship is satisfactory under any of the widely varying load conditions between empty and full. The mail load, which may be anywhere from 500 to 1000 lbs., is placed in pits in the lower stub wings approximately directly on the center of gravity.

Probably the most unique feature of the "Airbus" is its wings. The ship is a sesquiplane and has been developed from the experimental Bellanca plane, the "Roma." The upper wings are similar to that of a conventional braced wing monoplane with the exception that each wing is divided into two panels.

From the outer end of each stub wing another lifting surface called the auxiliary wing goes up to meet the outer panel of the upper wing, thus acting at the same time as a bracing strut in addition to a lifting surface.

The lower stub wings in particular fulfill a number of purposes. They act as lifting surfaces, form part of the landing gear structure, and contain the waterproof mail compartments.

Criminal Captured by Flying Officer

A SECRET midnight air dash from Detroit to New York in a Ford tri-motor airplane recently enabled Lieutenant John Hoffman of the Detroit detective department to capture a man badly wanted in connection with the murder of Jerry Buckley, Detroit radio announcer.

Lieutenant Hoffman stepped up to his quarry in a Bronx bank just twelve hours after he had received a "tip" in Detroit that the man he sought was preparing to flee to Italy. The plane ride from Detroit had taken 5¼ hours. The journey by train would have required fourteen hours. It was one of the most spectacular cases on record of the use of the airplane in tracking down suspected criminals.

Fins Increase Stability

FISHLIKE fins for airplanes have been invented by Dr. C. M. Vance of Pomona, California, to increase a plane's stability. The two horizontal flippers under the nose are for fore-and-aft stability, while vertical fins fastened beneath the upper wing are said to aid in preventing side slips or tail spins.

According to the inventor, if fins are placed in the air stream with their leading and trailing edges parallel to the center line through the fuselage, and mounted so as to move toward and away from the fusealge, they will register any change in the directional air flow from either side of normal.

A view of Dr. Vance's ship. Note the fins beneath upper wing and flippers under nose.

In so doing they will pull the aileron down on the side toward which the plane is slipping. The fins maintain the normal flying position of the plane in level flight, and bank it to the proper angle on turns and when leveling out after the turn. It is said that the pilot could just as well forget that he has an aileron control, so perfect is this action.

HOW TO BUILD A SAIL-WAGON

By J. B. ROBERTS

A general view of the sail-wagon described in this article. The reader can safely vary this construction to suit the dimensions of the material he may have at hand.

When you grow tired of building ordinary things, try your hand at this speed wagon. Design it to suit yourself. On windy days you can do 50 m. p. h. —without p o w e r! Even Louis Bleriot had one!

SOME time after the close of the Revolutionary War, the inventive Philadelphia genius, . O l i v e r Evans, contrived a wind-propelled vehicle that at first seemed to be the solution of the transportation problems of that day. In short, this brain child of Evans' consisted of a large lumbering van provided with a tremendous sail, and weather permitting, Evans created a great sensation and a considerable amount of damage in the suburbs of Philadelphia until the strong arm of the law intervened and called the whole thing off. The speed was not great, as speeds are regarded today, but in Evans' time a speed of twenty miles per hour was sufficient to terrorize the whole human and equine population.

Later, the same idea was tried out by running the sail-wagon on rails instead of over the highways, but eventually the scheme fell through for the same general reason that sailing vessels disappeared from the high seas.

For a time the breeze-buggy craze died out altogether, and then just before the World War the idea was again revived by the famous Louis Bleriot, a monoplane celebrity. Bleriot and his competitors found that they had hit upon a popular pastime, and there were great numbers of these light, fast sail-wagons scooting over the beaches at watering places such as Dieppe, France.

However, the arrival of the war cut short further experiments along these lines, and after the war, conditions did not favor the furtherance of the scheme. It has always been the fate of the sail-wagon to arrive just about the time that a war was brewing or during some other calamity.

Bleriot's sand-hoppers were very well designed and constructed affairs. Externally they much resembled an ice boat in which the conventional runners or skates were replaced by wire-spoked ball-bearing bicycle wheels. The frames were of light steel tubing, and in every respect the details were carefully worked out so that the little ships were both light and substantial.

It was said that a speed of 70 miles per hour was attained on a hard, level beach with a good stiff breeze blowing. This is entirely possible since it is a well-known fact that an ice boat will travel much faster than the wind that blows it. Ball-bearing wheels gave little friction, and the whole ship was so light that it fairly floated along without much resistance. From the data at hand it would seem that these crafts would prove very popular on the beaches of Florida and California where there are long stretches of smooth, hard sand just after the fall of the tide.

IT is very alluring, this idea of scooting along at the rate of a mile per minute, or better, without burning gasoline or without any of the expense connected with the construction of more elaborate vehicles. If you have ever sailed an ice boat, you will appreciate the thrills that accompany the sailing of a craft of this sort that are entirely unlike any other sensations experienced with the common flivver or car. Silently, but with irresistible power, the wind sweeps the light wagon along with ever increasing speed—a sensation most comparable to coasting down an endless hill in a toboggan.

In the accompanying view I show a typical sail-wagon constructed either from steel tubing or light ash stringers securely tied together with metal fittings. The wood mast carrying a lateen-type sail is mounted in front and just above the front axle with enough clearance so that the boom can swing back and forth over the head of the pilot when tacking about.

There are other types of sails, of course, that can be used for this purpose, but the lateen is the simplest and easiest to make. Some of the more elaborate sail-wagons were provided with a jib, but it is doubtful whether this complication added enough speed to justify the extra work and expense.

It should be noted that the rear wheel is fixed rigidly, contrary to ice boat practice, and that the front wheels only are pivoted to the axle for steering. It was soon found in the experiments carried out in France that the single rear wheel is not very effective for steering, and while this may seem the easiest way out of the problem, yet it is not recommended.

The front wheels are spread well apart, from six- to eight-foot centers, so to prevent the wagon from turning

Here is a view of the Bleriot Aeroplage. Its weight empty is 132 lbs. These sail-wagons are frequently seen on the beaches of Belgium and France.

over when sailing across the wind. From front to back is from ten to fourteen feet according to the size of the sail, but in any event, this dimension should be at least two feet greater than the length of the boom.

Depending upon other conditions, the mast may be from eight to twelve feet high, giving a sail area of at least 20 square feet and preferably 25 square feet. The sail area of racing ships is, of course, much greater than this so that every possible ounce of propulsive force can be applied to overcoming the friction during light breezes.

In constructing a sail-wagon you should not lose sight of the fact that the sail introduces heavy stresses into the framework and that the high speeds attained make a strong but flexible frame necessary at the points where the axles connect to the chassis.

A simple bucket seat or even a board will suffice for a seat, unless the builder is exceptionally fussy, but no matter what kind of seat is used it must be kept down as low as possible so the boom can swing back and forth without inflicting any injury to the skull or the alleged brains contained therein. If the seat is high, then the boom must also be well above the ground and this makes the whole affair "top-heavy," which is not a desirable feature of a sail-wagon.

PARTICULAR attention should be paid to the wheels, which should rather be strong motorcycle wheels than the bicycle wheels specified in a foregoing paragraph. There is a good deal of side stress or "side swipe" on these wheels due to the wind pressure on the sail, hence the wheels should be well wired to take up side stresses—better braced than with the average bicycle wheel.

While plain bearings can be used, ball bearings give so much easier running that they are by far the more desirable type. The axle stubs of the wheels can be screwed into the ends of the steel tube running across the axle where rear steering is used, thus simplifying construction, but by far the most desirable arrangement for the front wheels is a steering knuckle arrangement similar to that employed on the front axle of an automobile.

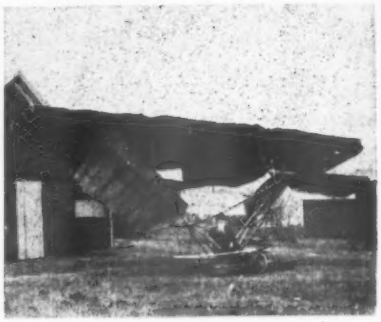
It is even possible that a Ford front axle could be used for this purpose on a large ship, including the wheels and tires, but if this is done, then the sail area should be fully 36 square feet or even greater in order to overcome the greater weight and friction.

Many of the early ships were steered by foot rudder bar, just like an airplane, but a steering wheel can be substituted for the foot bar so that the ship can be steered after the fashion of an automobile. Whatever system is employed, it should be substantial so that it will withstand the many sudden and heavy shocks at high speed that are always encountered even when running on a dead smooth surface.

Steel rods or tubes are preferable for these important members of the assembly and are far more dependable than wire controls often used with light vehicles. Broken steering gear is likely to lead to a serious accident at high speed and must be provided against.

In this particular layout, the pilot's seat is shown in advance of the mast, contrary to the usual arrangement. This avoids "ducking the boom" at every tack, and gives a much better view than when the seat is aft of the mast as in the usual ice boat layout. Building one of these ships is most interesting and we would appreciate notes and letters from those of our readers who have taken up the construction.

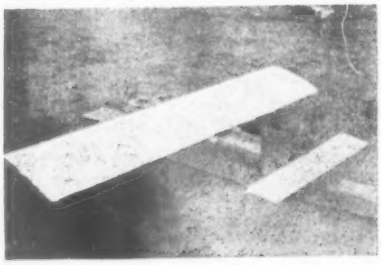
It is impossible to give detailed dimensions for the various parts for the simple reason that such affairs are made of various odds and ends found lying around the place and for which no advice can be given in advance.



Claims Ship to Be First Air Machine

W. H. MARTIN of Canton, Ohio, is seated in the cockpit of his plane. Martin claims his ship was the first air machine to be built in this country. He completed its construction twenty years ago and was a contender with the Wright Brothers for first flying honors.

How to Build a Rocket Model



The model is just taking off with a ¾ lb. rocket. Total weight, 1 3/8 lbs.

MODEL plane fans are just beginning to realize the possibilities in rocket propulsion for their model planes. What is more interesting than to build and balance a model plane, light the fuse and then watch as she darts away with a roar and a streamer of flame?

Such a model is easily made, easier indeed than the conventional rubber band models, and is inexpensive. A good type to make is a flying stick model with wings 30 inches long, fuselage or carrier 20 inches long with 1/16 in. sawed veneer tail surfaces.

The wing should have a six-inch chord (width) and have a high lift airfoil, about 7/8 inch in thickness. Ribs are of conventional design. The beams should be strong but not heavy spruce, 3/16 inch by 3/8 inch, with some form of bracing. The wing may be covered with paper or silk.

The stick fuselage may be made in rectangular design, of 3/16 inch by 3/8 inch spruce spars, spread about 2½ inches with cross members of the same size as the spars. These spars should be "thinned" down beginning about seven inches from front and cutting to 3/16 inch in depth at tail. A piece of veneer 1/16 inch by 2¼ inches by 9 inches will make a good stabilizer (tacked and glued to tail). Make rudder and tail skids together, one rudder and skid on either side of spars, made of veneer 1/16 inch by 2¼ inches by 3¾ inches, bottom curved and extended one inch below spars. Rudder fastened just in front of stabilizer.

Make sturdy skid or wheeled landing gear and make carrier large enough to carry from 1 to 1½-inch rockets and use sheet aluminum deflector just behind rocket to prevent wing from catching afire.

To assemble: Carefully balance (with one-inch rocket in carrier) over pencil and place mark over center of gravity. Then figure your center of lift at .40 from leading edge, approximately 2 3/8 inches in six-inch wing. The center of gravity must be placed quite far forward of the c. of l. for two reasons, one: because of large thrust and, two: because burning of charge lightens rocket and there must be weight enough to pull nose down to glide. Place c. of g. about ½ to 5/8 inch forward of c. of l. for 1-inch rocket; 7/8 to 1 inch for 1¼-inch rocket and 1¼ to 1-3/8 inches for 1½-inch rocket. Rockets must always be placed as close to wing as possible.

In launching it will help the model to take off by placing on a board and placing a small block under front of board. The model will take the air before the end of board is reached. Correct for balance after first trial. *When rocket is lighted step a dozen feet away.* I once had a model loop the loop around my head spraying me with fire.

Rockets for the models may be made but are a little dangerous for the novice. They may be bought from any fireworks company, in which case stick and sparklers are removed and front plugged.

Good results are obtained if a little care is used. I have made flights up to 125 feet.

—Charles A. Bushnell.

Army Flyer Describes Fatal Plunge

WHILE flying between Maui and Hawaii, at an altitude of about 8,000 feet, an L. B. 5A Bomber, piloted by 2nd Lieut. T. L. Boyd, Air Corps Reserve, with Staff Sergeants H. Alexander, John Becker and Private H. L. Cowan as crew, crashed in the open sea.

Relating the details of the accident after reaching Luke Field, Lieut. Boyd told of his frantic efforts to get Staff Sergeant Becker to jump, his efforts to get to him to jerk him from the cockpit and his own crash against the tail surfaces in which he carried away the rudder:

"We were buzzing along smoothly at the time as the last plane in a formation of four," Lieut. Boyd stated. "The other three made a triangle ahead of us. I noticed the right wing beginning to settle and turned the wheel to bring it up. The wheel refused to turn, although I tugged with all my strength, shouting to Alexander.

"Alexander was sitting on my right in the pilot's cockpit. As soon as he saw what was wrong he threw up his hands to show me it was hopeless. So I cut the gun and we both shouted to get Cowan and Becker to abandon ship. Alexander went over the left side and along the fuselage. I stood up hanging on to the wheel and shouted to Cowan several times. He was slow to realize what was happening, but when he did begin to climb back he was perfectly cool. Then I turned back, going over to the right side on to the lower wing. Alexander was on the right wing shouting and pleading with Becker to jump. I began to shout and swear at him, but he staved in his cockpit. Alexander let go and shot away from the plane. He was on the inside of the curve, the best place to leave the ship. I was on the outside.

"I knew I was supposed to be the last off, and we were plunging down toward the sea. We had dropped about 2500 feet by this time and as I went out of the cockpit the air speed indicator was already 175 miles an hour. I decided I would grab Becker by the collar and pull him out. As I made a move toward him the wind shot me into the tail. I crashed hard against the controls and the rudder came off with me. But I didn't feel much pain. I was mad more than anything else.

"The plane turned over once in a half roll and then went down vertically. I was falling head first and the plane was directly ahead of me. I saw the white shreds of a parachute flapping in the tail and felt sick because I had left the ship ahead of Becker. I pulled the rip cord when I saw the plane hit the water. My chute opened at the same instant I heard the noise. I was swinging hard when I hit the water. I slapped up against the side of a wave and it knocked me out. When I came to I was being dragged through the water by my parachute, which was still in the air.

"On the way down I realized it was going to be a big job getting untangled in the water, but I couldn't do much about it. My shoes and socks were torn off when I struck the rudder. My helmet and goggles disappeared also, and the buttons were gone off my kapok coat. I was hanging on by the arm pits. As soon as I hit the water I began to struggle with the parachute. It took me 10 or 15 minutes to get out of it. I think I hit the water first because I dropped farther than the others. Alexander went farthest down wind and Cowan was behind me.

"I saw Lieut. Jones land and try to get Alexander, but he was pulled off their wing when the wind got into his parachute. I was in the water a half hour before I was picked up."

Lieut. Boyd attributed Becker's death to panic which caused him to delay his jump and then open his parachute while still in the plane. He expressed the belief that Private Cowan also struck the tail controls of the plane and dislocated his shoulder at the time.

Refueling Tank Offers Complete Service

THE Heil Co. of Milwaukee, Wisconsin, has been awarded a War Department contract for the construction of thirty airplane refueling tank units.

Each refueling unit is literally a service station on wheels. The Heil-built airplane refueling unit is fully equipped to supply air, water, oil and gasoline to planes. The water, gasoline and oil is pumped by power-driven rotary pumps, driven by power taken from the transmission of the truck. The oil and gasoline is filtered and accurately metered.

Three hose reels, each accommodating a suitable length of hose, are provided, one for water, one for oil, and one for gasoline. There are no hose connections to be made when servicing the plane since the hose reel and hose are always directly connected into the pumping system, permitting wet hose operation.

Oil and water must be supplied to the airplane motor at crank case temperature. This is accomplished by an exhaust heater, which transfers the heat thrown off by the truck exhaust pipe to the lubricating oil and water compartments, preheating the oil and water to the desired temperature. The temperature of the oil and water is indicated by thermometers provided for that purpose.

An air compressor in combination with an air storage tank provides the necessary facilities for supplying air to the landing gear tires. Separate controls permit pumping oil, water and gasoline individually or imultaneously.

Pilot's Warning Prevents Trainwreck

BUT for the heroism of Mal B. Freeburg, night air mail pilot for the Northwest Airways, Incorporated, "Bobby" Jones, idol of all golfers wherever the game is played, might now be among the missing.

Today Assistant Postmaster General Glover received a report from B. F. Myers, Assistant Superintendent of the Air Mail Service stationed at Chicago, recounting the deed performed by Pilot Freeburg which, undoubtedly, saved from serious injury, if not possible death, the hero of all golf fans.

According to Myers' report, Freeburg was flying the night mail from the Twin Cities to Chicago, on July 12. Near Trevino, Wisconsin, he noticed an unusual glow below him. In dropping down to look it over he discovered a Chicago, Burlington and Quincy railroad bridge afire. Having passed a passenger train headed that way a few miles back, Freeburg turned back until he met the train. Circling the train and flying low, the air mail pilot flashed his landing lights, dropped a flare and by so doing caused the engineer to bring his train to a stop a quarter of a mile from the burning bridge.

The train was heavily loaded with passengers, including "Bobby" Jones, returning from the Open Golf Tournament held at Minneapolis.

Freeburg then flew ahead and circled the bridge several times, all the while flashing his lights, attracting the train crew's attention to what was wrong. Then the mail pilot picked up his course and headed for Chicago, arriving there with his mail on time.

Freeburg made no comment of his heroic deed other than to request new flares. It remained for the train crew to spread the news of what Freeburg had done.

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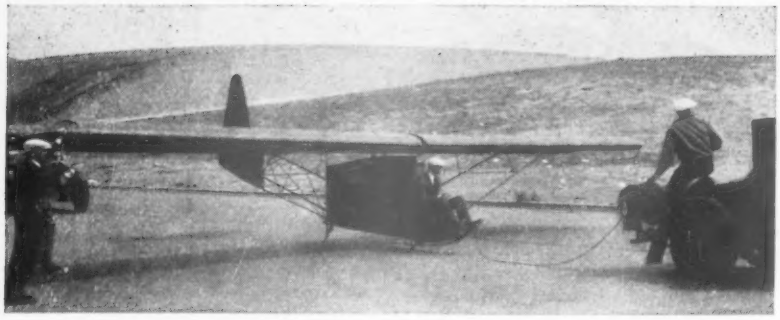


Primary Glider Gives Secondary Performance

A GLIDER combining the open construction of the primary type ship, yet having a performance closely approaching that of the secondary glider has recently been brought forth by a group of San Francisco sailflyers.

The ship was designed and built by Ray Stafford, and is regularly flown by members of the group over the San Francisco sand dunes.

Fuselage construction is of steel tubing using band and screw connections, while the wing is of the usual wood construction. Steel tubing wing struts replace the conventional wire bracing common to primary gliders.

Because of reduction of drag due to this item and also to the use of the stub fuselage behind the pilot, a reduction in sinking speed and an increase in gliding angle is noticeable.

The minimum rate of descent is about 2¼ ft. per second and the gliding slope about 1 in 12.

Model Acts Human

LAST winter while experimenting with a large compressed air model plane, the writer discovered a curious phenomenon. The plane was a monoplane type with a 4¼-foot spread. The motor was a three-cylinder radial with a 24-inch tank. (Incidentally this model was built from plans which appeared in POPULAR AVIATION several months ago.)

On the day on which the flight was made it was very cold and the sky was overcast. After the tank was pumped up, the model would take off gracefully, but as soon as the plane gained a little altitude, the motor would slow down, sometimes stopping completely; then it would start up again only to slow down and stop as before.

Sometimes the plane would land but would take off again before it could be reached, just as if a pilot was at the controls. And now for the explanation:

One of the laws of physics is that the temperature of a gas increases with the pressure. Conversely, as the pressure decreases, so does the temperature. You have noticed how cold a tire valve gets when the air is allowed to escape rapidly.

When the tank was pumped up, the air naturally contained moisture from the atmosphere. As mentioned before the weather was near freezing. As the air rushed from the tank its temperature was lowered. These factors caused the water vapor to condense and freeze in the intake pipe leading to the motor. With the air cut off the ice would soon melt only to freeze again. As this behavior shortened the length of flights considerably it was remedied by wrapping adhesive tape around the airpipe as insulation.—Manley Mills, Anderson, S. C.

Famous Flyers Go Back to Work

EVEN champions, like vacationists, go back to the job.

Walter Hunter, of the Hunter Brothers endurance flyers, and Benny Howard, whose home-made plane won him $6,000 in cash and the title of "pylon polisher" at the National Air Races in Chicago, are back to their regular jobs as mail pilots on Universal Division, American Airways, Inc.

Howard, who built his mighty little speedster in spare time between carrying the mail between St. Louis and Omaha, had a two-weeks leave to test the ability of his craft at the air races, where he captured five first prizes and two third prizes, including third place in the Thompson cup race, for speed.

Solar Sesquiplane Gets Approval

THE Solar all-metal sesquiplane, an eight-place cabin transport manufactured by the Solar Aircraft Company, recently received department of commerce approval.

The sesquiplane type was selected as it gives more rigid bracing of the wing structure than in the monoplane design and at the same time furnishes greater aerodynamic efficiency than the conventional biplane. An additional advantage of the sesquiplane design is that it permits a wide tread landing gear with a minimum of external bracing.

The pilot's cabin placed forward off the leading edge of the upper wing provides the pilot with excellent visibility in all flying positions, as well as in taxiing. All windows in the pilot's cabin are of shatterproof glass.

How Helium Is Produced

THE Government's Helium Plant, near Amarillo, Texas, is capable of a production of 24,000,000 cubic feet per year. Its output is limited by the demand of the army and navy for helium rather than by its capacity to produce.

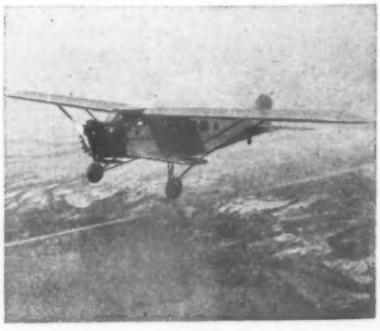
Helium-bearing natural gas for the Amarillo plant is drawn from Government-owned gas wells on the Cliffside structure northwest of Amarillo, Texas, where the Government controls gas right in about 50,000 acres of land; it is transported to the plant through a Government-owned pipe line.

In the plant the helium is extracted by cooling the natural gas under pressure to a very low temperature at which all of its constituents, except the helium, are liquified. After the helium has been drawn off, the other constituents are returned to the gaseous state by warming them up to atmospheric temperature. Each cubic foot of natural gas that enters the plant is cooled from atmospheric temperature to about 300° F. below zero and returned to atmospheric temperature in less than one minute. The gas from which the helium has been extracted is discharged into a pipe line, with its heating value improved by the extraction of the helium, and is sold for use as domestic and industrial fuel.

Under present conditions it costs less to operate Government airships with non-inflammable helium than it would cost to operate them with flammable hydrogen. The first cost of hydrogen, as produced for airship operation, may be somewhat less than the present cost of helium. However, when diffusion of air into the gas envelope reduces the purity of the hydrogen to about 85 per cent, the envelope must be deflated because of decreased buoyancy, fire risk and danger of explosion. As no safe and economical process for purifying this hydrogen has been found, it is allowed to escape into the atmosphere and the ship must be reinflated with new hydrogen.

This operation is necessary eight to ten times a year. When air diffuses into a helium-filled ship, the only serious effect is to decrease the lifting power. In this case, however, the helium can be purified at a cost of from 50 cents to $1.50 per thousand cubic feet.

The Solar sesquiplane in flight.



How to Become an Army Flyer

By LIEUT. C. E. CHAPEL, U.S.M.C.

Dozens of well-known flyers started as Army Cadets. If you want to know what opportunities await you as an army flyer—read what Lt. Chapel has to say.

JOHN JONES, an average young American, in an average little town, wants to be an aviator, but he has no money for expensive courses at civilian flying fields. Being an "air-minded" chap, he has read of Lindbergh's training as a Flying Cadet of the Army Air Corps.

John at first wonders whether or not the War Department in Washington is too busy to take an interest in his affairs, but after considerable thought he decides that a two-cent stamp is not much of a gamble, and proceeds to address a letter to the Adjutant General of the Army, Washington, D. C., requesting information and application blanks.

Then follows an anxious wait of four or five days, and at last there arrives a long, official-looking envelope containing a little pamphlet entitled: "Flying Cadets of the Air Corps, Aviation as a Career," and two blanks, one of which is a blank application for appointment and the other is an affidavit blank. Both of these must be properly filled out and returned to Washington, after which he will be notified as to the date of the next examination.

The pamphlet received from the Adjutant General explains that appointments are open to individuals possessing the necessary educational, physical and moral qualifications, and that selection is made from enlisted men of the Regular Army, members of the National Guard Air Corps, members and graduates of R. O. T. C. units, and civilians.

Jones, being a civilian, is eligible, but to increase his chance of being selected he can join a National Guard Air Unit stationed in his neighborhood if it does not have too large a waiting list, or he can join the Regular Army. If he happens to have graduated from a college having an R. O. T. C. unit his chances are better than as a civilian.

John further finds that he must be unmarried, a citizen of the United States, and between the ages of twenty and twenty-seven years. The pamphlet tells him that he should have completed at least two years of college work. Jones looks further and finds that college is not necessary *if* he can pass an equivalent mental examination. The character requirement is easy; Jones is well and favorably known to leading men of his community.

IN executing his application for appointment Jones is careful to comply with the requirements stated by the Adjutant General of the Army. His application blank is filled out in triplicate, three copies are also made of his affidavit, and three persons of recognized standing in Jones' community write letters attesting to his good character.

If John was fortunate enough to complete satisfactorily two or more years of college he encloses a certificate from his college registrar giving his record as a student. If John decides to take his chances as a civilian he mails all of these papers direct to the Adjutant General of the Army, Washington, D. C.

As soon as John's application has been approved by the War Department he will be notified to appear before an examining board. Boards for the examination of candidates are assembled at many cities scattered throughout the United States so that no candidate need spend more than a few dollars for travel money to appear before his board.

The examinations which confront Jones are three in number, physical, educational, and psychological. The first of these has for its purpose the selection of men physically normal and the elimination of those having defects or disease which would become aggravated by flying training or which would increase the hazard of such training. No exemptions are granted; everyone must take the physical examination.

A group of Army Cadets receiving instruction in Aerial bombs at Kelly Field, Texas.

Cadet receiving final instructions before taking off.

The aviation physical examination is more exacting than that provided for enlistment in the Regular Army and is different, in that particular attention is given to those factors and functions of greatest importance in flying. Vision must be normal; that is, 20/20* for each eye without glasses, but special stress is laid on the balance of muscles and the refractive error, both of which must be within established limits.

If Jones proves to be color blind, that also constitutes a disqualifying cause. His hearing must be normal, and his equilibrium cannot deviate from accepted standards. In addition to all of these qualities, the applicant must have no tendency to nervous or mental instability.

IF Jones can present documentary evidence of having completed at least two years at a recognized college he is exempt from the educational examination, but in lieu of such proof he can take a substantiating examination which is the equivalent of two years of college.

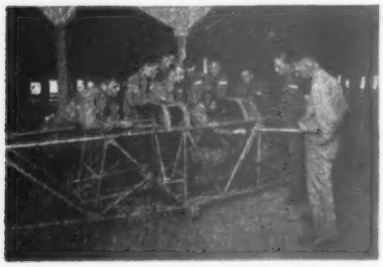
Those not exempt from the educational examination are required to be tested for knowledge of United States history, English grammar and composition, general history, geography, arithmetic, higher algebra, plane and solid geometry, plane and spherical trigonometry, and elementary physics. The pamphlet sent to the applicant by the Adjutant General explains in detail just what is expected of the examinee in each of these subjects.

The third examination, the psychological, aims to isolate individuals who do not have inherent flying ability. Flight surgeons assigned to the Army Air Corps subject the applicant to a practical test to determine his reaction time under various stimuli; and a personality analysis given by specialized flight surgeons who would be known as expert psychiatrists in civilian life.

If Jones passes the physical, educational and psychological examinations he is sent at government expense either to the primary flying school at Brooks Field, San Antonio, Texas, or the primary school at March Field, Riverside, California, where he is given the

*Perfect; applicant with 20/50 sight, at 20 feet distance can only decipher letters that he should be able to read at 50 feet.

psychological and physical examinations over again. There are usually a few out of each class that fail to pass these examinations the second time. These men are then returned to their



A group of Kelly Field Cadets receiving instruction in aerial radio.

point of enlistment at government expense, so that they are out of pocket little or nothing.

LET us assume that our friend, John Jones, passes successfully in all his examinations. He then has a choice between heavier-than-air, or lighter-than-air training (balloons and airships). Both courses last one year.

After about 250 hours in the air and considerable time spent in classes on the ground Jones finds himself a graduate of the Air Corps Training Center, with the designation of "airplane pilot," and a commission as second lieutenant in the Army Air Corps Reserve.

Graduates of the Balloon and Airship School (Belleville, Ill.,) are rated as "airship pilot" and "balloon observer," and commissioned a second lieutentant of the Army Air Corps Reserve.

While undergoing instruction as a flight cadet Jones receives $75 a month as base pay, and a ration allowance of one dollar per day. His uniforms and equipment are all furnished free by the government.

Jones luckily finishes one of the aviation courses; he receives his rating as an aviator and his commission in the Army Reserve. He is now offered active duty with the Air Corps as a second lieutenant for one year, during which time he enjoys all the privileges, allowances, and pay of a second lieutenant of the Regular Army. His pay is $183 a month, unless he occupies government quarters, in which case he is docked $40 a month for his house or apartment. Out of this money he must buy his own uniforms and pay for his food.

This year of training is of great benefit to the aviator, whether he decides to enter civilian life or take an examination for a commission as an officer in the Regular Army. If the latter is his choice he is given certain exemptions and priority as a candidate for a Regular Army commission.

Bellanca Plane Equipped for Endurance Flight

CAPTAIN George W. Haldeman and Lieutenant Stewart Chadwick, pilots for Bellanca Aircraft Corporation, Newcastle, Del., are now in Jacksonville making preparations for an attempt at the world's duration record without refueling. They have with them the Bellanca sesquiplane formerly known as "The Roma," which was built originally for a non-stop flight from New York to Rome. This flight never took place and the ship was repurchased from the backers by the Bellanca Company and has since been used as an experimental plane. The Roma cost originally somewhere in the neighborhood of $70,000 to construct. Its very unusual aerodynamic qualities are perhaps best illustrated by the load which Captain Haldeman expects to lift into the air. The ship itself weighs 4570 pounds and into it will be loaded approximately 1500 gallons of gasoline, 40 gallons of oil, weight of both pilots, food, water and other supplies, making a total weight of 14,600 pounds.

It will be noticed that this is more than three times what the ship weighs empty and that it will actually lift into the air a little over two pounds for each pound it weighs itself. Its wing area is 606 sq. ft. and the single Pratt and Whitney hornet motor with which it is powered develops 525 H. P. This makes a load of 22.4 pounds per sq. ft. of wing area and 27 pounds per horsepower. These figures are remarkable in the extreme when it is considered that there is only one airplane built in this country at the present time which holds a Department of Commerce approved type certificate which permits it to carry a load in excess of its own weight empty. This ship, also a Bellanca, is a freighter model of the Bellanca Pacemaker which has a weight empty of 2290 pounds and carries a licensed load of 2310. The licensed load of the average airplane runs approximately 2/3 to 3/4 of its own weight.

The gasoline which they will take aloft is expected to be sufficient to beat, by a comfortable margin, the present world's record of 66 hours 37 minutes now held by two Italian fliers.

Gasoline Drum Burns

NOT long after the absorption of Mr. Stout's company by Henry Ford, the original airplane factory caught fire and burned, although it was a so-called "fireproof structure."

During the process of removing the twisted steel columns and beams Mr. Ford appeared on the scene and watched the workmen as they struggled with the remains of the building. His comment was that the principal difference between a fireproof building and one that is not fireproof is that a fireproof building is much more difficult to remove after the fire has done its work. Henry, you know, is usually right.

But that isn't what we started to tell. While cutting up the twisted steel debris with an autogenous flame, one of the workmen suddenly encountered a flare and flash such as he had never experienced before and he backed away in great haste and with no little fright. He had set fire to something, he didn't know what.

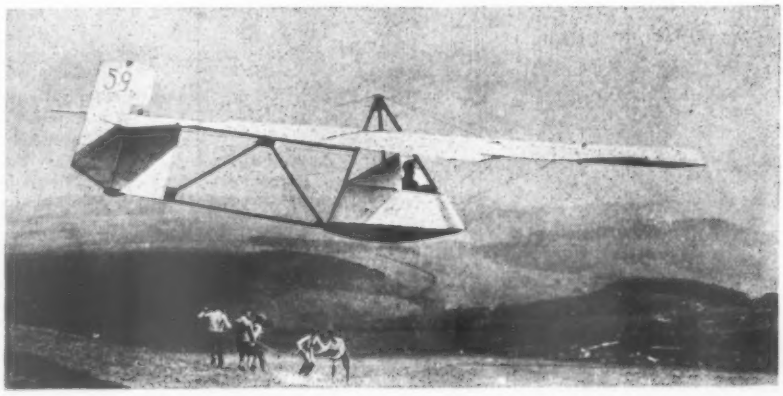
On inspection after the flare had ceased it was found that this man had cut into a drum containing gasoline, and it was gasoline that was burning with such violence.

Of course the remarkable thing about this is that the gasoline tank or vessel passed through the intensely hot fire and held the gasoline through it all without bursting and even without leakage. To be sure the workman did not suspect that he was cutting into a tank containing gasoline, or he certainly would have been more careful However no damage was done.

Latest German Glider

GLIDING has become a national air sport in Germany and has almost reached that stage in the United States. German experts have been brought to this country to demonstrate the construction and operation of their famous motorless machines.

Here is shown one of the latest types on its takeoff for a flight at the famous Rhon Glider School. The five men forming the land crew can still be seen holding the rope with which the craft was launched.



Practical Lessons in Flying

By JOHN B. RATHBUN

Lesson IV. Flipper Turns

BOB and the pilot-instructor had been busily engaged in making turns and wheeling over the airport for some time, trying the effect of the controls on the turns and studying the effect of speed on the banking angle of the wings.

Bob quickly discovered by experience that the banking angle depended entirely upon the speed or the sharpness of the turn, a steep bank for a quick turn or at high speed and a flat banking angle for slower or greater radius. And it was also soon impressed on his mind that a considerable amount of speed was lost in making a turn so that it became necessary to open the throttle wider or enter into a dive to maintain the proper speed of the air over the wings.

As a matter of record, Bob nearly stalled the ship twice on turns because he neglected the dive or throttle.

"Do you see that pile of junk over by the north fence?" asked the pilot. "Well, once upon a time that was a perfectly good, sweet flying ship. Then came along a smart Aleck student who made a turn while he was taking off, in spite of instructions to the contrary. He stalled on the turn, and from what I hear, he is still wearing a plaster-cast. The ship is past plaster-casts or any other repair.

"We just leave that wreckage there as an object lesson and warning to fresh guys who think they are flying a pursuit ship instead of a trainer with an OX-5 engine. If you had an Army Hawk with a 400 h. p. engine aboard you would be able to take off and climb at the same time, but not with a school ship carrying a skinny 90 h. p. Making sharp turns near the ground, particularly with a 90 h. p. engine, is nothing for a student to attempt—believe me.

"Your turns so far have not been so bad. This is because you are paying attention to what you are doing. You start all right with your controls in the neutral position as they should be in a straight-away (Fig. 1), and then in

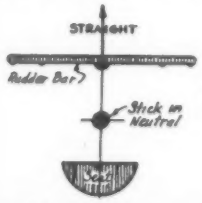


Fig. 1. Start with your controls in the neutral position as they would be in a straight-away.

making a left turn give her both left rudder and left stick at the same time with the stick just a trifle forward of neutral to help the dive along (Fig. 2). You are overcoming the natural tendency of using the rudder bar like the handlebars of a bicycle—the rudder bar turns in just the opposite direction for the same turn.

"When you make a turn on a motorcycle you just turn the handlebars, and the cycle turns simultaneously without

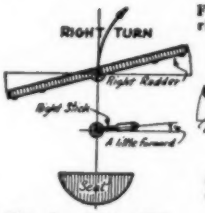
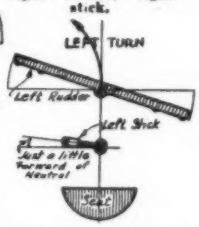


Fig. 2. Left turn, left rudder, left stick.

Fig. 3. Right turn, right rudder, right stick.



further fuss. Turning an airplane can be compared to making a turn with a motorcycle at 50 miles per hour on a hillside road with the pavement nicely soaped and oiled. You must always make allowance for skidding or slipping by correcting the ship with the ailerons.

"When you skid or slip with a motorcycle," continued the pilot, "you know it right away because you immediately see the position of the road, but in a plane there is nothing apparent to your sight so that you must depend upon your other senses to detect the skid or slip."

FIG. 4 shows how the student wrecked the ship spoken of in an earlier paragraph, by attempting to climb and turn at the same time with insufficient power. He took off at (1) and started

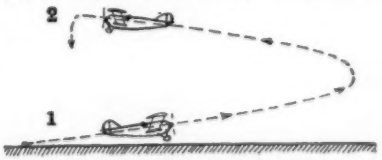


Fig. 4. A student took off at (1), attempted a turn too soon and stalled at (2).

the turn a few feet off the ground, losing speed all the time until he finally stalled and crashed at (2). There was no hope for the ship because it was still too close to the ground to gain speed by diving, and this is one of the many reasons why an underpowered ship of the homemade variety is never safe.

If you have a pursuit ship or racer with plenty of reserve power, then you can spiral upward on a steep gradient as indicated by Fig. 5 without danger, for these ships are built and powered for just this sort of thing. There must be enough engine capacity to provide the power for climbing plus the power required for overcoming the head resistance induced by the turn.

When the ship is banked up so steeply that it is practically standing on wing ends, then the drag is very considerably increased because of the increased unit lift necessary to sustain the ship in this attitude. The wings are no longer so effective and the angle of attack must therefore be increased so that an abnormal drag is produced.

"Well," said Ed, the pilot, "while you think that you are having your troubles in an open cockpit machine, it may amuse you a little when I tell you that making turns are even more difficult with a closed cabin ship. Here your face is exposed so that a blast of air from either side will warn you of slips or skids, but in a cabin plane you are denied this warning and must transfer your attention to another part of your anatomy.

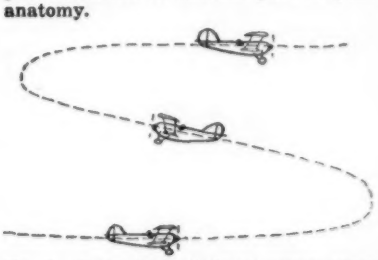


Fig. 5. If you have plenty of reserve power then you can spiral upward on a steep gradient.

"Of course, most of these elaborate cabin ships are provided with bank-and-turn indicators that give the required information as to the proper bank, but on the other hand, you can't be expected to keep your eyes glued on the instrument board all of the time. There are times when your eyes must be somewhere else.

"Now, you have been making all sorts of turns just as you felt like or were ordered to without following any particular course," continued Ed. "To follow some particular course is not always so easy. I will now ask you to follow the fence around the field as closely as you can, entering over the grandstand and then going around and around until I ask you to stop. This field used to be an old horse race-track with long, straight stretches on the side and rather short rounded ends so that this will give you plenty of practice."

Bob swept into the course as directed along the straight stretch, and then turned and banked up at the east end. Whether by accident or design, this was an excellent turn and he thrilled with pleasure at the pilot's "O. K, old kid."

Now he straightened her out, reducing the bank at the same time until she

was flying straight-away with the wings on an even keel. So far, so good. The ship was going around the fence in a right-handed direction with all right-hand turns. "Dead easy," thought Bob, with his confidence returning.

Now came the turn at the west end, and all too quickly. To follow the fence he applied the rudder quickly, stick to right as usual, but forgot all about the speed. The engine groaned, and a quick, snappy burst came over the phones:

"If you don't keep her nose down below the horizon, I'll ground you for a month. Nose her down and give her the gun, for the name of Pete. You'll lose all of your altitude," shouted the instructor.

With all of this excitement, Bob was quickly off his course and after a whole lot of maneuvering and a torrent of explanation from the front cockpit, they were again chasing along the fence line. With the exception of two infant slips and one or two minor skids, Bob finally managed to hold the fence under him until the whole thing became a habit.

"LET'S take a shot at a nice sharp turn. Get up some more altitude and see how short you can turn about that stack way over there. Get about 1,000 feet under you before you try it, though, and remember what I told you some time back about your elevator and rudder controls becoming inverted when you bank up more than 45 degrees. This last dope may come in useful if you are going to do what I think you are."

When about 500 feet from the stack, Bob started on the turn, kicking the rudder hard over, and banking up as steeply as the wind pressure on his cheeks dictated. At first, wind pressure on his face at the inward side of the turn told him of an inner slip which he corrected by reducing the bank, and then he so reduced the bank that the air pressure was quickly transferred to the other cheek and he increased the bank, always holding the nose down slightly. He made one half turn and then straightened out and started away.

"That's the steepest you've done yet, but go back and make her shorter and snappier. Just imagine you are in a 50-mile race with a pylon turn every mile and that your sweetie is in the grandstand watching you." Bob smiled at this, and started back at a good speed, resolved to stand her up on end if it was the last thing that he was to do on earth. Nearer and nearer came the stack, and then over hard with the rudder and left stick.

Up went the right wing until it loomed high above him, but when he started to pull out of the turn with the rudder he got his first shock. Down went the nose into a dive while the wind screamed through the rigging. To correct the dive, he pulled the stick back but the total result was to pull out of the turn with the diving speed still increasing.

"Right-rudder, right-rudder, right rudder," shouted Ed, and then like a flash the thought of inverted controls came over his mind. The elevators were no longer acting as elevators but as rudders so that they did nothing to check the dive. However, the rudder was now horizontal and acting as an elevator, so by giving her right rudder, the rudder raised the nose.

"Now, back with the stick and to the right with it," yelled Ed. The ship came out of the turn and the wings descended until normal straight flight was again assumed.

"WHAT did I tell you about the rudder and elevator changing places when you are on a steep bank?" called the pilot. "You see it is different to play with inverted controls on the ship in flight than it is to watch a blackboard sketch. If you had been just a little more observant instead of being so rattled you would have felt a change of pressure taking place on the controls. This is where you must keep your wits about you and develop a nice sensitive feel on the controls.

"You will, by this time, appreciate the fact that great skill is demanded of the race pilot in making short, snappy turns around a pylon at high speed and with his wing tips just a few feet off the ground. We're going to try a few more of these 90-degree banks, and then still more of them until you have mastered the knack of making any sort of turn, either normal or with inverted controls.

"The steep banked turn that you just made is called a "flipper turn" because you actually steered the ship around the turn with the elevators or "flippers" instead of with the rudder."

Fig. 6 indicates the normal position of the controls in horizontal flight or at

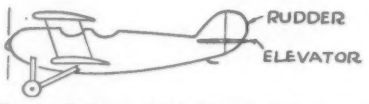


Fig. 6. Position of the controls in horizontal flight.

any banking angle up to about 45 degrees. The rudder surface is vertical and will now steer the ship to the right or left, while the elevator or "flipper" surfaces are horizontal or nearly horizontal so that they will raise or lower the nose when the stick is pulled back or pushed forward. This condition holds on all banked turns up to about 45 degrees, and then a change takes place with a further increase in the banking angle.

A ship in a very steep bank is shown by Fig. 7, the wings making an angle greater than 45 degrees with the horizontal. The rudder is now in a horizontal position, or nearly so, and is shown turned so that it tends to point the nose down in a dive—just like an elevator. As shown, the rudder is in the "left rudder" position, hence if we wish to lift the nose out of the dive it will be necessary to apply "right rudder" by pushing the rudder bar in the opposite position.

On the other hand, we must steer from right to left with the elevators or flippers so that pulling the stick back

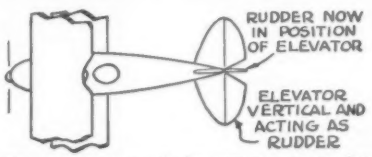


Fig. 7. Position of the controls in a steep vertical bank.

gives us a left-hand turn, while pushing the stick forward produces a right-hand turn. The aileron controls alone remain in their customary relation.

FLIPPER turns on a steeply banked ship are the ultimate in making turns, and require a considerable amount of practice before the student is sure of himself. However, they are a necessary part of the training and are not simply trick stunts like aerobatics.

After Bob had tried about ten flipper turns with fair success, the last two being quite exact, Bob heard some new questions coming over the phones. "Did you notice that it was somewhat harder to make left-hand turns than right-hand turns? And did you notice that every time you pointed her nose down quickly there was a noticeable tendency to wheel her around left-handed?"

Bob had noticed this some time before, but he had made no comments on the subject, partly because he thought it somewhat imaginary and felt ashamed to raise the question. However, he now picked up his courage and beckoned the pilot to proceed with the story, which might have some bearing on his awkwardness with the left turns and that peculiar quick wrench that took place when the nose was snapped down quickly.

"BELIEVE it or not," said Ed, "there is a difference in turning right or left. This is commonly explained by charging it up to 'propeller torque,' but there is more to it than that. However, let us wait until the next lesson before going any further. I'm hungry."

(To be continued)

Plan to Bomb Horses

AFTER concentrated round-ups and organized hunts had failed to wipe out the huge herds of wild horses that infest eastern Oregon, army planes may be employed to bomb the big horse herds.

Wild horses have become a serious problem in Colorado, Montana, parts of Wyoming and eastern Oregon. The animals are said to be roving the states, spreading the dreaded *dourine*, an infectious disease fatal to domestic horses. It is believed that squadrons of army planes, dropping bombs on the wild herds, may succeed where round-ups, hunts and other measures have failed.

American Flyers Return From Europe

AFTER four months of demonstration flying in European capitals, 1st Lieut. James E. Parker, Air Corps, test pilot at Wright Field, Dayton, Ohio, set the wheels of a plane down on home soil recently and quietly slipped back into his job. Lieut. Parker went to Europe as a member of a "Flying Mission" organized by the Curtiss-Wright Company to demonstrate their planes.

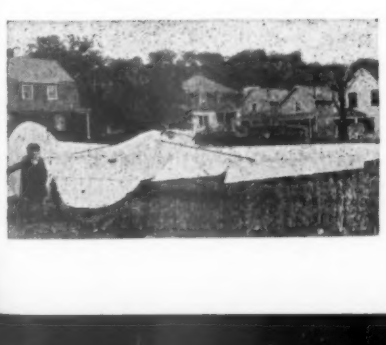
Four planes formed their fleet—a "Fledgeling" (two-seater training), piloted by Captain Cannon; a "Falcon" (two-seater observation), piloted by Lieut. Parker; a "Robin" (three-seater passenger), piloted by Mr. Goulding, and a "Hawk" (single-seater Pursuit), piloted by Lieut. Doolittle. The party landed at Athens, Greece, the latter part of April and gave two flying exhibitions for the military and civil authorities, which Lieut. Parker describes as follows:

"First," he says, "Cannon went up with the 'Fledgeling' and showed the control in stalls close to the ground and in landings. He then went up to a thousand feet, put it through loops, spins, rolls, inverted flight, pulled one or two Immelmanns and landed. Then Doolittle and I took off, did a couple of dives and chandelles in tight formation, then broke and gave a mock combat fairly low. Then I took the 'Falcon' up to a thousand feet and twisted it about, followed by a couple of dives with either loops off the ground or Immelmanns, some flying on the side, a fast speed flight over the crowd, and landed.

"Doolittle had climbed to about 6,000 feet by the time I landed, and made a power dive, rolled upward, looped, rolling in the loops, a double Immelmann and a loop out of it. He then dived, followed by an inverted climb or zoom, gave an inverted flight, side flight, landed, took off into a loop and landed. It lasted about twenty minutes and so was fairly snappy.

"Everyone was more impressed by our flying on the side than anything else we did. They thought it remarkable."

It sounds most snappy and remarkable. As one of the Greek newspapers naively expressed it, "None of the French or other foreign acrobats who have passed through Saloniki have presented such wonders to us. Probably their machines did not permit them to do so." They refer to Lieut. Doolittle as "the quickest in the whole world."



Why Engines Cut Out

IT happens repeatedly that an engine which has passed a careful inspection by a competent mechanic immediately prior to a takeoff, suddenly refuses to function at full throttle just after the machine has left the ground.

The fault in the majority of cases lies in poor fuel flow and under a given set of conditions the percentage of engine failure due to this cause will be astonishingly high.

If after a flight the carburetor and the fuel lines are drained as is customary, when the engine is being started up for the next flight the flow of gasoline from the main tank to the carburetor is impeded by air in the gasoline lines. When the lines were drained of gasoline, air replaced the liquid. This air has a tendency to resist the flow of gasoline when the gasoline is turned on and begins to flow to the carburetor. Sufficient gasoline will reach the carburetor for the purpose of starting the engine, idling it and also to give full revolutions for a moment or two before the flight starts. But the supply of gasoline is often diminished by one-half or even more, owing to the interference of the air in the gasoline lines.

When the aircraft takes off at full throttle, there is probably enough gasoline in the bowl of the carburetor to take the machine off the ground and into the air. A few seconds after that, however, and just at the critical moment during the takeoff, the gasoline accumulated in the carburetor bowl is used up, the diminished supply from the main tank is not sufficient to keep up a proper flow to the carburetor, the engine sputters, fails, and the pilot is forced to make a landing at a time when it is frequently impossible to do so with safety.

Low Wing Glider Built at Home

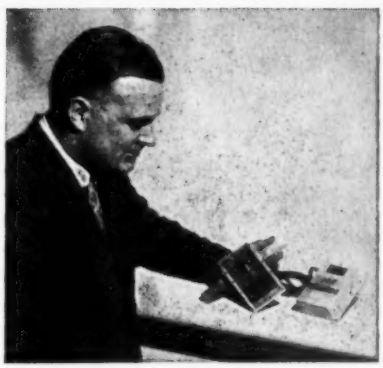
A HOMEMADE glider designed and built by D. L. Brown and fourteen-year-old son, George, of Summit, N. J., was successfully tested at Hanover Airport, N. J., by "Chet" Newman of the Orion Flying Service.

Mr. Brown, without previous experience in designing, building or flying, was highly pleased with the performance of the glider when flown by Chief "Chet" Newman. This glider was constructed in the cellar and was started last October.

It embodies several unique features, with some radical departures from ordinary practices on construction and rigging in gliders and airplanes. Most gliders have skids, but this one has three wheels as shown in photos. Taxiing is greatly facilitated by connecting tail wheel with rudder post.

The designer plans eventually to install a two-cylinder motorcycle engine to power the glider. The leading-edge on the wings is unusual, being a half circle in cross section at the nose and then terminating into the common section of aerofoil practice. The landing gear is split axle type, with novel rubber shock absorbers and 7'0" tread. The main wheels 20"x4" were purchased from Clarence Chamberlain's famous "Sperry Messenger." Specifications are:

Span 30'0"
Length 21'0"
Maximum chord 6'0" tapering to 3'0"
Front spar 14" tapering to 4" at tip, built up
Ailerons 8'0" long
Stablizer 10'0" wide
Rudder 34"x48"
Elevators 21"x10'0"
Fuselage cross section 26" square
Aerofoil Brown's own development



Instrument Warns Pilot When Ice Forms

EXCEPTING only fog and darkness, perhaps the greatest foe to flying is the formation of ice on the propellers, wings, struts, and wires of aircraft. When an airplane is sheathed in ice its load is not only appreciably enhanced but the aerodynamic shape of the craft may be changed, and therein lies a real menace. H. B. Henrickson of the Aeronautic Instruments Section of the Bureau of Standards has designed a device which indicates when an airplane is flying through an ice-forming zone, thus warning the pilot to ascend to a higher, colder altitude or descend to a warmer, lower level above the surface of the earth.

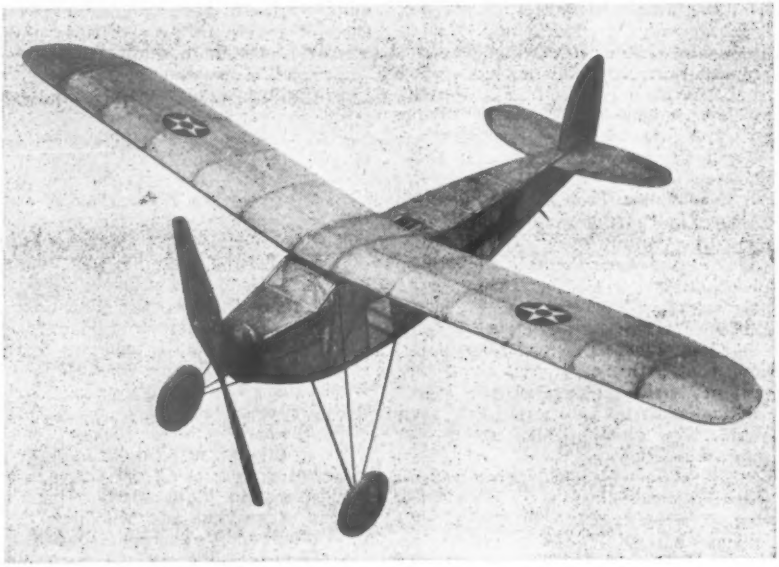
Barely larger than a hand, this self-contained ice-warning indicator flashes a light behind a tiny red window when the airplane enters an atmospheric region where the temperature lingers between 28 and 32 degrees Fahrenheit.

XUM

MODEL DEPARTMENT

How to Build a Fairchild

By
JOSEPH S. OTT



An actual photograph of the completed model. It is a fine looking ship and if carefully built will give excellent performance.

Necessary Materials for Building "Fairchild" 28" Wing Span

1 Tissue, large sheet, 3 ea.
2 Cement, large tube, 1 ea.
3 Dope, 2 oz. can, 1 ea.
4 Rubber Motor 1/32"x1/8"x12', 1 ea.
5 Star Emblems (optional) 2 3/4" diameter, 2 ea.
6 Star Emblem (optional) 1 3/4" diameter, 1 ea.
7 One Coil Piano Wire, 1 ea.
8 Shaft, 1 ea.
9 "S" Hook, 1 ea.
10 Rear Motor Base Hook, 1 ea.
11 Bamboo 1/16"x1/4"x12", 6 ea.
12 Wheels 2" diameter, 2 ea.
13 Wing Adjusting Beam 1/8"x5/16" x15" (Pine), 1 ea.
14 Propeller 8" (Balsa), 1 ea.
15 Ribs 1/16" thick (Balsa), 14 ea.
16 Motor Stick 3/16"x1/4"x15" long (Balsa), 1 ea.
17 Spars 1/16"x3/16"x15" (Balsa), 8 ea.
18 Entering Edge 5/32"x5/32"x15" (Balsa), 4 ea.
19 Trailing Edge 1/16"x1/8"x15" (Balsa), 4 ea.
20 Longerons 1/16" x 1/8" x 24" (Balsa), 10 ea.
21 Nose Block 1/4"x2"x3" (Balsa), 1 ea.
22 Washers (Brass), 3 ea.

Construction of Model in Detail

MATERIALS specified should be cut to sizes as shown by the drawings or as called for in the article.

Body: Left Side, Right Side

Make a full size sketch of the left side of the body on a smooth piece of board. Cut all the parts to the proper length and hold in place with pins. Apply the cement to all joints and allow to dry. Make the right side of the fuselage in the same way, being certain that both sides are as much alike as possible. This may be accomplished by cutting the left and right sides at the same time. After all the joints have dried the pins should be removed and the side lifted from the board. A knife or razor blade may be used to assist.

Top Side—Crosspieces

Cut the top side and all the bottom crosspieces at the same time and mount all the parts into position with pins and cement as before. While pinning the parts down be sure that the body is not warped out of shape. After cement has dried, cut away from the board with a sharp knife.

Nose Block

Draw a circle on the thick nose block and cut to size with a saw or carve with a razor blade. Where the longerons extend into the plate cut small corners out so the 1/16"x1/8" pieces fit into the back side of the nose plate. The plate should not be put on the fuselage until the oblong hole is cut through so it will allow the motor stick to be passed into place.

Wing Adjusting Beam

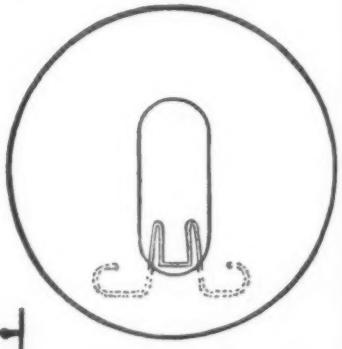
The wing adjusting beam is made of pine as pine withstands the pressure of the wing clips much better than balsa.

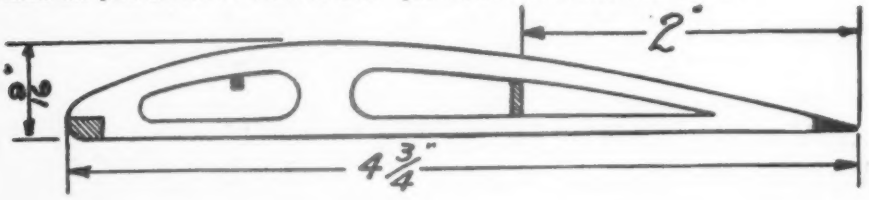
Ribs

Cut 14 ribs according to the full-size pattern shown in these instructions.

Wing

The wing should be assembled in the same manner as the body, i. e., by pinning to a board while cement is drying. Build the wing upside down on the board. In this way, the spar may be held flat and straight and the wings placed in position from above. While the cement on the ribs is drying, the wing tips may be bent to shape. This is accomplished by bending the bamboo and holding it to the side of a flame of a candle or Bunson burner. The bamboo should be moved back and forth so that the heat is applied evenly around the part formed. When the proper curve is obtained remove the bamboo from the heat and submerge in water so as to recement the sap in the bam-





Actual size drawings of a sample rib, nose block, and clip provided for motor stick.

boo. In this manner, the bamboo tip will always hold its shape. Cement the entering and trailing edges to the ribs. These should be blocked in place while the wing is still on the board. A tapered wing is a little more difficult to build than a straight one, but the finished tapered wing has a much better appearance and is much more practical. The wing tips should now be cemented in place. Be sure that they fit without forcing.

Rudder and Stabilizer

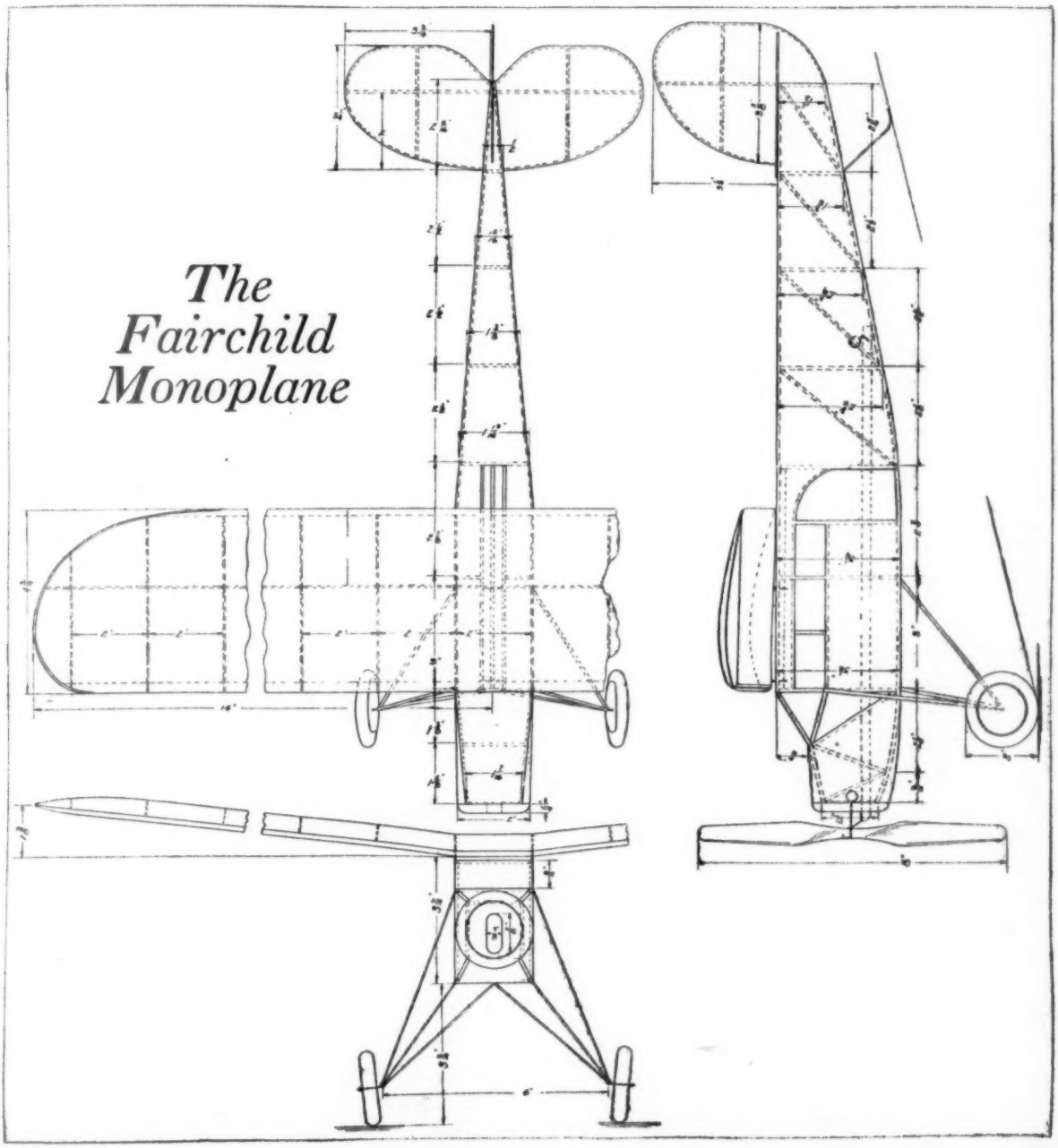
All parts for the rudder and stabilizer are made of bamboo bent to shape as described in the paragraph titled "Wing." In this case, bend the bamboo in a large piece and trim down afterwards. Make full-size patterns and lay the shapes upon them and cement together. When they are dry attach the completed parts to the fuselage.

Covering the Model

The covering of model planes should be one of the most careful operations performed. A wing, improperly covered, may be distorted so much from a true line as to make it impossible to fly the model. The tail and stabilizer should also be covered with great care.

Before covering a model, lay the part to be covered on the material and cut to shape, allowing one inch on all sides. Then iron carefully, smoothing out all wrinkles. Be careful, however, not to scorch the material. The heat from the iron will remove all excess moisture and contract or shrink the material and so prevent sagging after the part is covered.

Next, cement the material to the leading or forward edge of the part to be covered. Place a small amount of cement at the tips of the trailing edge, then stretch the material (working with the thumb and forefingers) towards the trailing edge and cement as you take up the slack. Be careful not to stretch the covering so tight as to twist the part out of shape.



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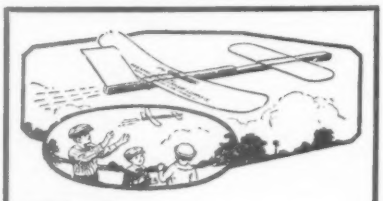
The body of the plane should be covered first as this is the easiest part, and the practice gained through covering the body will be of great assistance in the work that follows. Cover the sides and then the top and bottom.



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Landing Gear

Parts for the landing gear are also made entirely of bamboo, with the exceptions of the wheels. The outer strut can be attached on the fuselage as seen on the photograph. The wire axle (.032") is attached with thin thread.

Wing Clips, Hooks, Shafts

These parts should be bent to conform with the pieces they are to hold in place. The tools required for these are a good grade of side cutters and round nose pliers. Full size sketches are given for all wire parts. One wing clip attaches to entering edge, rear wing clip to wing spar.

Motor Stick

Balsa 3/16"x1/4" is used for the motor stick. The stick is held in place in the nose block with a clip. See diagram of nose block. At the rear the motor stick rests in a notch cut to receive it.

Doping

The tissue or coverings should be treated by doping. Dope fills the pores of the material, making it air-tight and waterproof. Dope also shrinks the material, drawing it up very tight and greatly increasing the strength. The first coat applied should be very light. In most cases, two coats are sufficient.

General Flying Instructions

It is now assumed that the model has been constructed according to the specifications of the plans and all that remains is to prepare the model for flight.

All model airplanes have nearly the same flying characteristics. The main flying wing on any model must be moved to the correct point of balance. The approximate position is found by balancing the completely finished plane, ready to fly, on the forefinger. The wing should be placed centrally over

Actual Photograph

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this point. It is immaterial whether the wing is above the body, as in this model, or below the body as in other types.

Find the approximate best location with a few trial glides. Launch by hand only. When gliding the model, it should make a very steady and gradual glide until it rests upon the floor.

If model stalls, the wing is too far forward. To remedy this, move the wing back about 1/8 of an inch. The wing can be moved back in small steps until it flies on an even keel.

If the model dives too fast and does not fly at all, move the wing forward in small steps until correct balance is secured.

If the model fails to climb fast enough, move the wing a trifle further forward.

The movement forward and backward of the wing governs the fore and aft (longitudinal) balance of the plane.

We are now ready for a trial flight. The first two or three flights should be a sort of check on the balance of the plane in general so do not wind to full capacity. Launch on an even keel. After the preliminary trials are satisfactory, the plane should be ready for regular flights.

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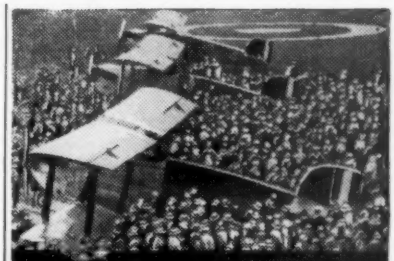

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WOMEN'S ACTIVITIES

EDITED BY LOUISE THADEN

Louise Thaden has been appointed Women's Editor to succeed Lady Heath. Mrs. Thaden has established several women's records and is nationally recognized for her achievements in aviation. Women readers who wish to correspond with Mrs. Thaden may address her, care of POPULAR AVIATION.

ON August 27th the 99's, only organized group of women pilots in the world, held their first national meeting in Chicago at the Drake hotel. The meeting was followed by a luncheon after which the 99's were driven to the field behind a police escort, as guest of the National Air Races.

* * * * *

The business meeting, in charge of Louise Thaden, secretary, was relatively short. Among the most important decisions were two resolutions: that there should be a woman member on the 1931 race committee, and that there should be one woman's derby in the 1931 air races, composed of different plane classifications.

* * * * *

Minutes of the meeting are being mailed to the 185 99's members.

* * * * *

Edith Foltz, who obtained a ship too late to enter the woman's derby, slipped a fast one on the race officials by putting a man in the front seat and flying in the Portland men's derby. Due to motor trouble with her Waco taperwing, she failed to place.

* * * * *

Amelia Earhart is planning on purchasing a Lockheed Sirius low-wing open cockpit monoplane. Amelia is still carrying on with T. A. T., and in addition is also vice-president in charge of public relations for the newly opened New York - Philadelphia - Washington airline. Using Stinson tri-motors, an hourly schedule is maintained between points. Fare is the same as railroad plus pullman.

* * * * *

For the first time in history, so far as I know, a woman has equaled a man's record. The woman is Mlle. Bastie of France, who established a solo non-refueling endurance record of over 37 hours. It was her third attempt, which more or less proves the old adage about third time being charm. Take heart, girls!

* * * * *

Phoebe Omlie of Memphis, Tenn., who placed first in the lightplane division of the 1929 and 1930 woman's air derby, says she is not going to race any more. Phoebe is just about the veteran among women pilots in this country, having been flying steadily for over ten years; before that she amused herself with wing walking and parachute jumping. Phoebe says she is going back to work again—work in that case meaning flying a Monocoupe all over the country for Mono Aircraft. At least the pilots in the lightplane division next year will have a chance to win some money with Phoebe and her Monocoupe somewhere else.

* * * * *

Florence Lowe (Poncho) Barnes of San Marino, Calif., a participant in the 1929 woman's derby until her Travel Air lost an argument with a Chevrolet as to which had the right of way on the Pecos, Texas, airport (?), spent $26,000 on airplanes for the races this year, only to discover that neither was eligible to compete, except in the free-for-all closed course. Poncho is now selling horses.

* * * * *

I shouldn't be surprised to see Amelia go after the speed record again, in a Lockheed, of course. This time the record will probably shoot up to around 225 m. p. h. At present it is held by Poncho at 197 m. p. h.

* * * * *

The 99's have voted to retain the same officers for the fiscal year. The 99's are rather unique in that there is no president nor vice-president. Louise Thaden serves as secretary, and Blanche Noyes of Cleveland as treasurer. Control is through the sectional governors.

* * * * *

Helen Richey, private pilot of Pittsburgh, Pa., has been keeping the Sunday crowds which congregate on Bettis Field holding onto their hats. Helen does her utmost to turn a Fledgling wrong side out—sometimes, she confied to me, unintentionally.

* * * * *

Ruth Nichols, another old-timer, ferried a Bird from New York to Nebraska, and stopped by Chicago to see the races on the way back. She is now more or less at a loose end at her home in Rye, N. Y.

* * * * *

Mary Alexander is helping with the opening of the Lynchburg, Va., airport, and has asked that all women pilots fly down as her guests.

* * * * *

Opal Kunz, of New York City, is endeavoring to "sell" a woman's national defense program to government officials. It is Opal's own pet idea, which she has been working diligently on for well over a year. The idea in general is that women pilots shall be ready to act in national emergencies in time of peace or war.

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LOS ANGELES

An Airy Chat

(Continued from Page 10)

Louise's followers when she was unable to enter the 1930 Air Races—but they were consoled with the announcement that Mrs. Thaden became the mother of a fine baby boy on July 29th, just a few weeks before the race was scheduled to start.

MANY reader of the old *Aeronautics* were tremendously interested in the series of aerodynamic articles by Alexander Klemin. Recently we have received several requests asking whether this series was available in book form. It is. Title: Simplified Aerodynamics. Price $3.50. Publisher, Goodheart-Willcox Co.

DURING the air races we had many enjoyable visits from out-of-town guests. Among them were Mother Tusch accompanied by Mrs. Henderson (mother of Cliff Henderson, director of the 1930 show). Both ladies refreshingly charming. Mother Tusch, you know, has a little bungalow near the army training field at Berkeley, Calif. Her place is called the Hangar and is famed as the clubhouse of visiting flyers. The walls of her home have been autographed at some time or other by practically every famous flyer in the country.

WE have a surprise for you on its way. Capt. Bogart Rogers is going to reveal just why our war flyers got drunk. There is no use kidding ourselves—the men in the active air service weren't tea-drinkers, and when you hear what Capt. Rogers has to say, you'll know darn well *why* they weren't.

ANOTHER surprise in store for you is a few articles on model construction from a renowned British model builder, W. Rigby. Mr. Rigby has de-

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signed many unusual models which were published in British magazines.

Among the models he will introduce to this country through POPULAR AVIATION is the Rigby Ranger sailplane. This ship has a wing span of *five feet* and can neither be stalled nor upset by wind under wingtips. It is simple to make and can be kept in the air any length of time.

He also will offer a strange looking "Cormorant," a tailless monoplane. This design is generally unpopular because of its freakish lines. Mr. Rigby claims, however, that this particular model has the best wing-area and stability in flight of them all.

The stranger and more foreign his designs, the more fun in making them. What say you?

OTHER features to appear soon are: Tricks in Handling Amphibians, by Ensign L. A. Clousing; in which Ensign Clousing tells of his experiences when he forgot to lower his wheels while landing on dry ground, or left them down while attempting a water landing. Capt. C. W. Purcell will give a full illustrated lesson on How to Roll Your Own Parachute, told in Capt. Purcell's inimitably humorous style. A special illustrated page on the lightplanes of Italy. An exclusive and rare release of photographs of the Question-mark (Coste's trans-Atlantic plane) showing the stripped fuselage and revealing the complete instrument installation. And also an illustrated story on how some army ships hold a forest fire at bay with their propeller wash—their tails facing the oncoming blaze.

I HAVE great news for our readers who want to build a lightplane over the winter. Ed Heath, president of Heath Airplane Co., has consented to prepare a special course of construction for POPULAR AVIATION readers on the Heath Super Parasol. This will be the first official release on the construction of a Heath Glider. Various other magazines have from time to time prepared and published Heath plans themselves, but never before has Mr. Heath prepared an official release for publication.

Blueprints are now being made. Photographs showing the various stages of construction are being taken. These plans will be ready in 30 days, so they will begin in the next issue, or at the latest, the January issue.

It will be the new Heath Parasol—with the increased wing span to provide greater stability at the sacrifice of a very little speed.

Incidentally, a whole flood of letters came in recommending specific plans to be covered in this series. The Heath Parasol was by far the favorite—all of which aided us greatly in winning Mr. Heath over.

By the way, we'll give a $50 gold watch to the first reader who sends us a picture of a Rhon Ranger built entirely from POPULAR AVIATION plans. Any takers-on? Just pictures of the completed glider—on the ground and in the air, and an authenticated letter of proof of flight from the builder.

I MUST thank the many readers who assisted in selecting the Heath. Also, the several readers who offered suggestions on the question of whether we should build a jumping balloon, a blimp, or a series of box kites. This latter question is still unsettled.

And my sincerest appreciation for the words of friendship and approval from the following:

Geo. G. Tyler
Juanita Wells
Otto Svejda
Raymond Pritchard
Fred N. Ridner
Laor King
H. Martin.

We are certainly pleased to hear from our foreign readers—particularly England and Australia. We have several very regular correspondents in these foreign lands and are always glad to know how well you Britishers like us.

MANLEY MILLS is investigating the possibilties of a home-made baby blimp:

"The gas-bag of such a craft could be made of 'pongee' silk, treated with linseed oil and varnished. It could be inflated with hydrogen generated in a home-made plant. An enclosed control cabin would be unnecessary, just a light frame-work would do. The blimp could be powered, either by a motorcycle engine or the new 'Cleone' motor.

Don't be so stingy with your findings, Manley. Tell us more about it.

AND once in a while we get a letter such as this one, and feel like doing outside loops in a fourth-handed Jenny.

"Contact. After reading letters written by you readers as enthused in the best aviation magazine on the market us myself, I thought I'd tell you how I enjoy it and why.

"'Airplane-itis,' as my friends say I have, struck me when I was seven years old, for at that time my father presented me with a solid wooden model of a Jenny: Needless to say, it grew (not the Jenny) till now I have it bad.

"Ten hours of glider flying are mine and a pair of wings from the Decatur Aero Club are mine also. I was about to answer the 'call of the air' when the T. B. bug moved in my left lung to settle down (I'll fool him, in fact he is on the move now). As a result I am grounded but not for good. I am young and a year will patch me up and then up for me.

"As you may suspect by now, I'm a subscriber and reader of your magazine and believe me, it is a pal I wouldn't part with for any money. Why, while I'm here in bed I can keep up with the latest on aeronautics and increase my knowledge. Furthermore, I make it my business to boost aviation no matter where I am and one always needs a reliable source to back him up against these 'one foot on the grounders'. POPULAR AVIATION is my source.

"Three cheers for the magazine that is the leader of the cause. You keep pace with the latest. It suits me just as it is. Believe it or not I have read 'em all from cover to cover. The last lasted me three days.

"I'm down but I'll be damned if I stay! Up for me!

Donald Boggs,
Macon County T. B. Sanatorium,
Decatur, Ill.

"P. S.: Hurry up next month's issue, I can't wait!"

Well, Donald, you sure have our best wishes with you. And you have carte blanche right to ask us as many questions as you darn please. How would some of you readers like to enter into correspondence with Don? That will help him pass the time away between issues of POPULAR AVIATION.

LEONARD F. CURTIS has saved enough money to go to a nationally advertised flying school. But he wants to know what he can earn after he has become a licensed mechanic. Leonard, for your sake we went to the trouble of digging up some special information on average earnings—so look through this issue carefully.

TANEMI ABATAKI has read that a Capt, Ball (English Ace) was the one who shot down Capt. Immelmann. There seems to be some question about it. Capt. Bursey does not claim to be the one—he merely was one of the squadron. We also had a letter from Alan S. Hopper of London, England, who tells us an altogether different story (we'll print it next month) about how Lt. McCubbin and Corporal Waller shot down Immelmann.

You've got me; I don't know who shot him down. Nobody seems to know for sure—but we do know that he came down and Capt. Bursey says he was in the party.

A VERY unusual letter came in from Ray Thompson out in Hollywood:

"The writer is in the process of building a fast seaplane for the Schneider Cup races to be held in 1931.

"The estimated cost of this plane is $70,000.00. We have now in the bank at this date $29,900.00. *(Continued on Page 58)*

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Popular Aviation—November—1930.

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A Day At the Air Races

(Continued from Page 28)

observation planes and the Ford and Sikorsky troop transports.

On the far side of the field we find the private planes flown in from all parts of the country and pass briefly over innumerable Ryans, Stinsons, Lockheeds and pretty nearly every standard plane you want to mention. They are all here.

On the way back we linger among the special racers and other contest entries. There are a number of powered glider types, the Aeronca, the American Eaglet, and a new one-place Cessna with an Aeronca motor. And here are some of the special planes built for the American Cirrus Derby. Most of them are single-seat low wing monoplanes and surprisingly fast for their power. We examine Lee Gelbach's "Little Rocket," the Gee-Bee Sportster, the Mono Aircraft and Wedell-Williams entries, all Cirrus powered, and then pass on to the fleets of Great Lakes Trainers, Monocoupes, Inland Sports, Davis Monoplanes, Wacos and many individual designs. Here are two Church mid-wings and there's Heath's low-wing "Cannon Ball" next to two of his parasols.

We're now back almost to where we started and we pause long enough to examine Hawks' Texaco No. 13, the Travelair Mystery Ship in which he broke the coast-to-coast record.

With darkness almost upon us we take our seats again and are glad to rest a few minutes before the start of the night's show. Soon the announcer directs our gaze skyward where we see far overhead three crosses of light, alternately red, white and blue. These are the army "Fireflys" flying three Douglas observation planes and the gyrations of the twinkly lights seemingly flying of their own accord is extremely interesting.

Following a magnificent fireworks display we watch a parachute jumper float down in the blinding glare of four army searchlights whose powerful beams converge from the four corners of the field.

Al Wilson in his old pusher closes the show by being "shot down in flames" by an anti-aircraft gun and the "flames" in the form of magnesium flares on his wings cast a bright glow over the now diminishing crowd.

The show is over and we tread our weary way homeward. We have seen everything the 1930 races have to offer, for with very litle variation, the same program is repeated day after day.

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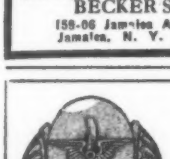

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(Continued from Page 18)

the most important factors in this connection, that is, the cooling effect of the air. Mr. Rathbun evidently based his formula on the assumption that the object so traveling would absorb all the heat generated by air friction; in reality, the surrounding air would absorb the greater part of the heat so generated while the metal would absorb less and less as its temperature increased until an equilibrium was reached where the air would absorb all the heat generated.

"I have learned a great deal from Mr. Rathbun's book and no doubt there is a great deal about aeronautics he could still teach me, so I consider it rather unfortunate for Mr. Rathbun that he wrote this article before he put his best thought to it."

DO not lose faith yet, Mr. K, for Mr. Rathbun has an answer to your letter which will knock the wind out of you, figuratively speaking, of course.

Several other readers have volunteered to prepare treatises on this subject, but, as you see, we haven't any more room. We'll even have to forego Mr. L. Mohme's offer—and it sure was a tempting one.

Mr. Mohme is a member of the 59th Service Squad, Army Air Corps, Langley Field, Va., and among his qualifications to answer Mr. Rathbun were that he has been "associated with high-speed aircraft in the Pulitzer and Schneider Trophy Races since 1922." He has designed and built fast racing ships himself. One of his jobs was the Navy's entrant in the Liberty Engine Builders' Race in 1926.

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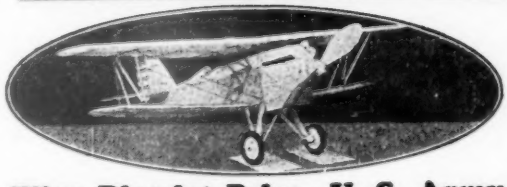
Order a kit today. Complete your model and return the official entry blank enclosed with each kit. Upon qualifying your model, you are licensed PILOT and awarded Silver Wings to Wear. From pilot you advance to Flight Commander, Squadron Commander, and the winner of the Grand Gold Prize of $100 and the 18" Silver Aviation Trophy winner will be known as Champion's Ace for 1931. Talk about fun! Talk about thrills! There's nothing in model aviation equal to this big $1,000 Contest. 165 Awards, Honor Certificates to all qualifying entries. Complete rules and regulations with each kit. The sooner you start the better your opportunity to win! Mail your order NOW! Your kit will be rushed to you by return mail!

All-Silver Lustre Finish Spirit of St. Louis

New 1⅛ ft. FLYING cabin model of Lindbergh's famous cross-Atlantic monoplane. Finished all over in BRILLIANT SILVER LUSTRE. Nothing like it on market. 90-second flight reported by New York purchaser. Dozens of others have qualified for Merit Certificates with this model. Realistic reproduction, even to "Lone Eagle" at controls. Tough 18-in. Mitschkbre wing and 12-in fuselage. Wt. 1½ oz. Simple A1C assembling outfit numbered. No tools needed. 6-in. fibre prop, readicut wood struts, Clark "Y" wing ribs, 1½-in. disc wheels, detail drawings, pictures, full directions, all COMPLETE in mailing tube, postpaid U. S. $1. Canada $1.20.

$1

ALL KITS GUARANTEED TO SATISFY--OR MONEY REFUNDED



Wins District Prize - U. S. Army Curtiss Hawk Flies 46 Seconds

Detroit, Mich., builder wins District Prize with this flying Curtiss Hawk kit. Another reports 46 seconds duration. Realistic reproduction of Uncle Sam's fast stepping pursuit ship. Celluloid wheels, imitation exhausts, synchronized machine guns, staggered adjustable wings. Army insignia in colors, detailed full size blueprints, complete. Hand-carved 10-in. prop., included in all kits.

To be covered with yellow and olive drab tissue. Canada postpaid $3.30; U. S. postpaid **$3**

To be covered with imported silk, genuine Hawk olive drab and yellow dopes thinned down for model use. Canada and west of Denver postpaid $5.50; U. S. postpaid..... **$5**

32-Page Catalog

Showing new models, new designs, constructed on the best aerodynamic principles. Real scientific methods employed, for Champion models are not toys. They teach laws of flight and give basic training in airplane construction principles. Catalog, full $1,000 contest rules given with orders, otherwise send **10c**

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Be the First to Fly these New Models

All kits and supplies guaranteed to satisfy, or for any reason within 5 days may be returned and your money refunded.

CHAMPION MODEL AIRCR/ FT SUPPLY
1523 Atlas Building, Columbus, Ohio

Gentlemen: I enclose $.....for which send me, right away Model kits I have checked below:

- ☐ Fairchild Folding Wing . . . $2
- ☐ Soaring Sailplane $5
- ☐ Spirit of St. Louis . . . $1
- ☐ Curtiss Hawk $3
- ☐ Curtiss Hawk Silk Covered . $5
- ☐ Lindbergh Lockheed De Luxe . $10
- ☐ Stanson Detroiter . . . $2
- ☐ Lindbergh Lockheed 2-foot . . $2
- ☐ Catalog, Contest Enrollment . 10c

Included extra for postage.....

Name.....

Address.....

City and State.....

Please write plainly

HONOR CERTIFICATES — $1000 IN PRIZES

$1000 IN PRIZES - 165 AWARDS - HONOR CERTIFICATES

An Airy Chat

(Continued from Page 51)

"This money is all from California, particularly from San Francisco, Pasadena, Los Angeles, and Santa Monica. As this is a United States entry why should the cost be borne locally?

"Would it be possible for you to devote a little space in POPULAR AVIATION *upon national cooperation for this project? As we are competing against foreign powers it is necessary for secrecy in regard to the construction of the plane and where the factory is located.*

"Expect to have this plane completed in ten (10) months time. Capable of developing a theoretical speed of four hundred twenty (420) m. p. h.

"As compared to the British Cup winners' weight of 3.6 pounds per horsepower, this racer weighs 1.3 per h. p. The motor, 24-cylinder, develops 1500 h. p.

"The total amount needed, including the entry fee, to finish this racer is $40,000.00, which must be ready by next fall to compete against the British Cup winner for the supremacy of the air for the United States.

"Through a popular subscription this money can be raised for the United States entry by next fall."

I told Ray we could not undertake the proposed campaign, but if some of our West Coast readers want to investigate the matter, they are privileged to enter into correspondence direct with him.

FRANK HABICK, JR., wants us to to run a lot of news on the Air Races. O. K., Frank, we're fixin' you up this issue. Incidentally, Frank is an ardent POPULAR AVIATION reader and tells us that he has been so enthused by "your magazine that I took up flying—got about five hours to my credit, and now I have been very lucky and made 'contact' in the 33rd division, 108th Observation squadron—in plain words I am a member. I can fly a ship of fair size. I have flown Waco 10—Heath Parasol—and Army Douglass with Liberty Motor."

IAN L. McKENZIE is a Naval Architect and points out a minor discrepancy in the recent true story, "The Spy of Mystery Field."

"I have been purchasing Aeronautics and POPULAR AVIATION *on the news stands for some months and thought I would drop you a line to let you know how I like it.*

"Your article on the Rhon Ranger Glider is sure a pippin, without a doubt the best glider contsruction article yet published, and in accordance with your offer in the August issue, I am enclosing my check for set of blue prints and instructions, and a year's subscription to POPULAR AVIATION.

"Capt. Jack Bursey's story, 'The Spy of Mystery Field,' is a little inaccurate in that the H. M. S. Vindictive was not sunk at Zeebrugge, but the blockships that were sunk were H. M. S. Thetis, Intrepid and Iphigenia. This I happen to know as I was a participant on the raid at Zeebrugge.

"At Zeebrugge H. M. S. Vindictive, and the Iris and Daffodil were used only as boarding

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Rooms with bath and shower	for one	. . . .	3.00-3.50-4.00-5.00
	for two	. . . .	4.00-4.50-5.00-6.00
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ROOMS WITH BATH
$2.50 and up

HOTEL TULLER
Facing Grand Circus Park
HAROLD A. SAGE, Manager

ships with ramps for landing troops on the Mole, and proceeded back to England after the engagement. But otherwise his story is close to what actually happened."

BESIDES being an editor, it seems that I am called on to be a lawyer. Well, nothing doing. I have a friend—Bailey Samelow—who is a lawyer with considerable experience in aeronautical law. Bailey gave me a hand on the answers to the following two questions brought up by Harry Phillips, who flies from his father's farm, completely surrounded by neighboring farms.

"Q—Am I responsible for accidents caused (such as teams of horses running away and doing damage) while I am taking off and landing?"

"A—In the absence of negligence on your part I do not believe that you would be liable under the circumstances. If horses are frightened and run away, the matter might be classed as an accidental happening for which there is no liability in damages."

"Q—If I have a forced landing, can the property owner sue me for more than the damage done?"

"A—The owner can only sue for damages done him and no more.'

WE'RE getting near the end now, so will tell you finally about a prize reader for the month. Hugh "Tommy" Thomasson is only sixteen years old, but writes to tell us that he is the "world's youngest chute jumper."

Tommy has been jumping since he was fifteen and has promised to send us a picture of himself in a double drop showing the first chute collapsed and the second not yet opened. These pictures would have been in this issue, but for the fact that our young friend was busy planning a jump for the junior altitude record.

—B. G. Davis.

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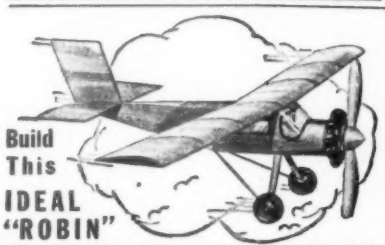

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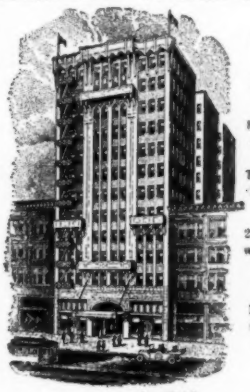

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FLY A "ROTOR KITE"
The latest flying WONDER

A Revolving cylinder makes it fly. No Wings, Propellers or Rubber Motors.

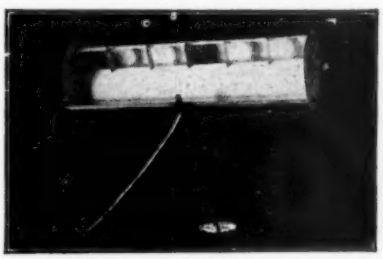
Most sensational development since the beginning of Aviation.

Easy to build this two-foot "ROTOR KITE" from complete set of parts, fittings, glue and instructions included in construction kit for only $1.50. A description of "Why the Rotor Kite Flies" is also included.

Send $1.50 now and we will deliver your set postpaid.

BE AMONG THE FIRST TO BUILD AND FLY THE LATEST SCIENTIFIC MARVEL. NOTHING LIKE IT ANYWHERE.

The "Rotor Kite" is ideal for launching model gliders.



You can also build a Twin pusher "ROTOR AIRPLANE" which flies beautifully. We will send a complete full size layout, showing all details and complete building instructions for 25c or complete construction kit for $2.50.

Remit by postal or express money order.
Dealer and salesmen inquiries invited.

ROTOR AIRPLANE & KITE CO.
12 E. 175th St. New York City.

--LOOK, FELLOWS!

New Prices Effective Sept. 1st, 1930

Knock-Down Motors	$1.50
Finished Motors	2.95
Tanks 20"x3"x3"	3.50
Tanks 24"x3"x3"	3.75
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Postage 10c on Motors. Postage 25c on Tanks

Dealers Write for Discount—Immediate Delivery

DOBE-OTT MODEL AIRCRAFT
28 NORTH CLINTON ST., CHICAGO, ILL.

XUM

Barnstorming

(Continued from Page 22)

Geneva, Dansville, Fairport, Le Roy, Medina, Newark, Penn Yan, Seneca Falls and Warsaw. In the city of Rochester you will find twenty concerns that either manufacture or sell at wholesale, ladies' ready-to-wear. These merchants are anxious to reach this trading area in the Spring and Fall.

You can make two cities a day on the tour. You leave early in the morning, arriving at the first city about ten o'clock. Leave there around three o'clock and arrive at the next place by four o'clock. Remain over night at the afternoon city. This means that you can visit ten cities in five days. The total mileage, if cities are selected forty miles apart, would be 400 miles. At twenty-five cents a mile this would come to $100.00. At each stop you will carry eight passengers, which at $2.50 each would be $20.00 a city, or $200.00 for the ten cities. This would make the flying end of the trip bring you the sum of $300.00. For this $300.00 you agree to carry a man, named by the merchant, familar with market conditions in his field, for the five-day tour.

The merchant will send out advance cards to the retailers in each of the ten cities. These cards will be worded as follows:

Number ——
ADVANCE SPRING STYLES
Mr.

---

of Rochester, will arrive in your city by airplane (date). He will outline to you the conditions in the ready-to-wear field this spring. Luncheon at the Hotel

---

12:15. Fifty cents a plate. Come and hear this Marketing Expert.

10 1st PRIZES of $600.00 each!

WIN one of the **10 FIRST PRIZES**

SURELY YOU CAN WIN ONE OF THEM

If you've never won before here's your chance For years we have awarded large cash and auto prizes to get publicity in new communities, but have given only one first prize at a time. Now, in our latest advertising plan, we want publicity in several communities at once. You and nine others now can each get one of ten big first prizes. Just think—not one but ten equal rewards of $600.00 each or, if you prefer, a brand new 1930 2-door Chevrolet Sedan, delivered by your nearest dealer. No other advertising plan like it. It is new and you can see for yourself how easy it is to be one of these ten lucky ones. Before now, you may have thought you couldn't win a first prize because someone else would be quicker on the trigger and beat you to it. But surely you can be one of the first ten, now. If you are, you'll receive exactly the same big prize as if you were the very first one.

FIND THE TWINS

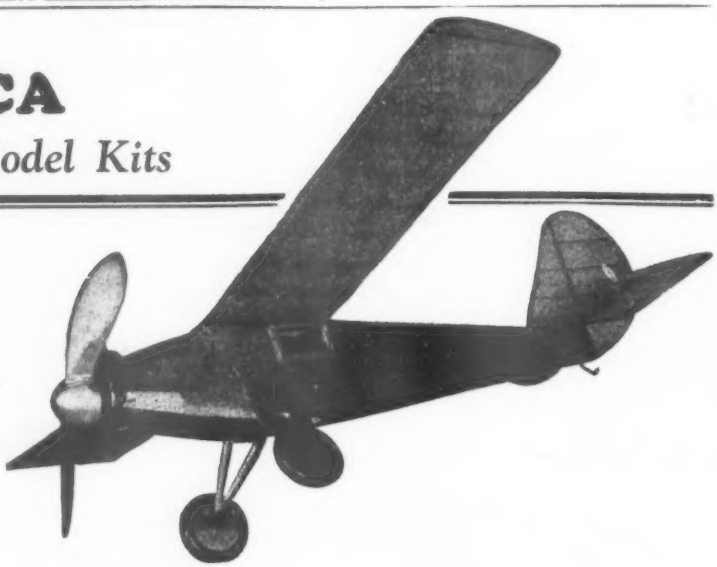
Be careful. Don't lose your chance. Study the thirteen heads shown here. They all appear different, but two are exactly alike—TWINS! Look at the hat crowns, hatbands, necklaces. The under side of the hats of some are part black and some all white. Each girl has a name. If you can find the twins, send me the names of the two girls who are twins. Mail a post card or letter with the names or mark them with a cross, but be quick.

ALSO 10 EXTRA PRIZES $50.00 EACH FOR PROMPTNESS making the total of each of the 10 First Prizes $650.00 or a Chevrolet Sedan and $50.00. If you have the right twins you will be qualified for this opportunity and may receive prize or cash. Duplicate prizes in case of ties. Send the names at once. No more purchase. No obligation. Send no money, but HURRY!

J. F. LARSON, Room 120 54 WEST ILLINOIS ST., CHICAGO, ILLINOIS

BOY SCOUTS of AMERICA

Official Model Kits



DESIGNED like real aircraft by experienced SILVER ACE Engineers to give the nation's boys dependable Kits, with splendid flying qualities and the most up-to-date improvements, yet quite as easy to build as old-fashioned stick models.

Boy Scout No. 1—50c
A Powered Glider
21-inch Span

Boy Scout No. 2—$1.25
A ½-oz. R. O. G. Cabin Model
Curtiss-Robin Type

Boy Scout No. 3—$2.50
Outdoor Duration Cabin Model. Stinson-Detroiter Type. 30-inch Span—Weight 1 oz.

All materials, drawings, and instructions in each box. Ready cut propellers and parts for a slight extra charge.

AERO MODEL COMPANY

Dept. PA9 111 North Wacker Drive Chicago, Illinois

NOTE: Bring this card with you. It may be one of the lucky numbers that will entitle you to a free ride in the plane.

Of course, cards would read differently for cities where the salesman appeared at night.

During the time you are waiting for your passenger to return, you can pick up additional passenger business. At any rate you will be assured of sixteen rides a day at $2.50 a passenger, in addition to your mileage at 25 cents a mile. The next week you start out with a tour for the millinery trade, etc. The eight free rides offered to those who attend the luncheon get the merchants out to hear the salesman. Stress this point when talking to the heads of the various industries.

Odds and Ends

INTERVIEW the candidate for Congress, Governor, State Senator, United States Senator or any other one of the numerous aspirants to public office. Lay out a speaking tour over the cities of your state. Visit the city, in company with the candidate. Before sitting down at the airport, release a number of small parachutes which have printed on them the words, "Vote for so and so for such and such an office."

The Unknown Soldier

This idea can be used on Memorial Day and Armistice Day. Select a list of ten cities of 20,000 or more population not over twenty-five miles apart. Charge each community the sum of $20.00 for dropping a memorial wreath over the grave of the Unknown Soldier in a cemetery named by them. Before dropping the "wreath" zoom down over the grave several times. A firing squad will add color to the scene. This makes a beautiful and striking effect.

The ideas presented in this article illustrate beyond a doubt that the small operator can make money by making Barnstorming a business rather than making it a mere passenger hop catch-as-catch-can.

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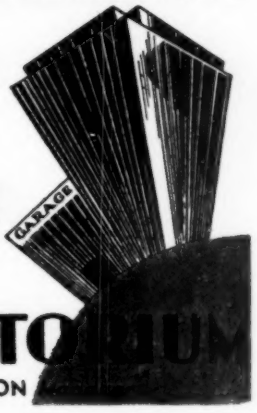
NOW EVERY ROOM WITH BATH

$2 $2.50 $3



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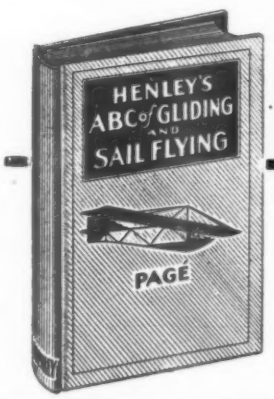

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In this book you have the benefit of practical American and German experience, extending over years: as well as the author's own pioneer experience. Contents include: History of Early Glider Development—Causes and Nature of Air Currents—Principles of Gliding—a study of Soaring Birds—Influence of Bird Flight on Glider Development—Sailflying and Typical Soaring Planes—How to Form a Gliding Club—Description of Modern Gliders and Sailplanes—Gliding and Soaring Terrain—Training Glider and Sailplane pilots—Some Details of German Sailplane Construction—Materials used in Glider Construction—Details of Training Glider Construction—Building the Dickson Training Glider.

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$5 per hour Solo

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What the Club is

Two years ago—a small group of air-minded young men organized the Edgewater Flying Club. Their aim was not to make money—but to secure through their combined efforts the highest type training and equipment at the lowest cost.

Succeeding from the start, the club is today the largest flying club in Illinois. In addition to its flying field at Elmhurst, just outside Chicago, the club owns its own licensed planes, has its own instruction staff of transport pilots, and is located in its own offices and club rooms where evening classes in ground work are conducted regularly.

What the Club offers you

To you—the Edgewater Flying Club offers complete ground and flight training under expert supervision. Working with the very finest equipment—and in the most congenial surroundings—you can earn your private pilot's license or your limited commercial or transport license—at the lowest cost in aviation history. Note the table to the right.

After joining the club—if you find you would have received comparable training elsewhere at lower cost—we will refund the difference in cash.

Consider what this offer means! Compare our rates with those of the ordinary school operated for profit. Then you'll understand what an advantage our non-profit organization offers you! Don't delay another day. Our available memberships are necessarily limited. Mail the coupon today and receive complete information without cost or obligation.

"Ask any member"

Private Pilot

Active Membership	$150
10 Hours Dual	100
10 Hours Solo	50
	$300

Limited Commercial

Active Membership	$150
20 Hours Dual	200
40 Hours Solo	200
	$550

Transport

Active Membership	$150
40 Hours Dual	400
200 Hours Solo	1000
	$1,550

Membership Department, Dept. PA-11
Edgewater Flying Club, Inc.,
357 N. LaSalle St., Chicago, Ill.

Without cost or obligation—please tell me more about your memberships and special flying rates.

Name.....Age.....

Address.....

City.....State.....

EDGEWATER FLYING CLUB, Inc. [Not for profit]

357 N. LaSalle Street
Chicago

A Stunt Flight

(Continued from Page 25)

off and started another long climb. At its end we were at our greatest height. Another long dive began. I had seen the outside loop for which this pilot was famous, and had watched him win aerobatic contests with it. I knew how it started and braced myself.

The motor hammered at my ears while my shoulders sought to tuck themselves under the edge of the cockpit for added resistance to the terrible centrifugal force I knew this loop to generate.

A great expectancy surged over me as we neared the turning point, but instead of the outside loop Lund pulled the ship into the conventional inside loop and started a second. Instead he did another vertical roll; slipped sidewise, caught, leveled and turned us on our backs. He straightened and made another loop and ended in a tail spin.

A curious conflict of disappointment and relief over the expected outside loop assailed me as I realized he was merely cavorting a bit before beginning the descent to the field.

Lund waggled the wings and I turned to look at him. He was grinning with delight and his lips framed the question, "How did you like it?" I only smiled for reply.

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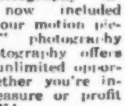

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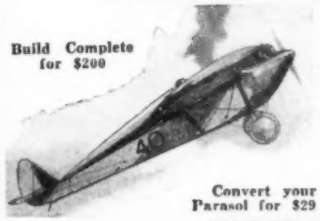

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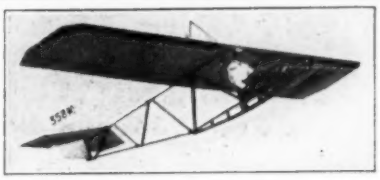

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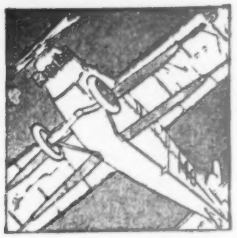

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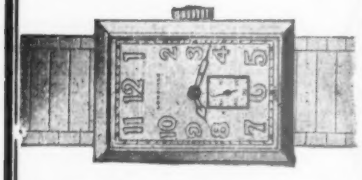

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Waco Thrills Natives

(Continued from Page 33)

moments the plane was floating, pontoons up, on the lagoon. The one plane the South Sea Island boasted was done for.

Lines from three of the larger harbor craft were attached to the pontoons and the plane towed to a nearby inter-island steamer, where she was righted with the help of the steam winches. A post-mortem showed that the forward struts had buckled, weakened, probably by the landing in rough water some days before.

Native mechanics were hired and the plane and motor were completely dismantled. And what I mean those natives were mechanics, in that they could undo everything with a nut or wire on it. Personally, I wouldn't have wanted the job of reassembling that Whirlwind. All parts of a particular size were put in one box, while other and related parts went into other boxes! The lot was shipped back to the states.

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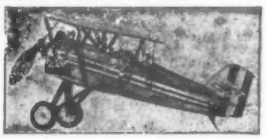

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